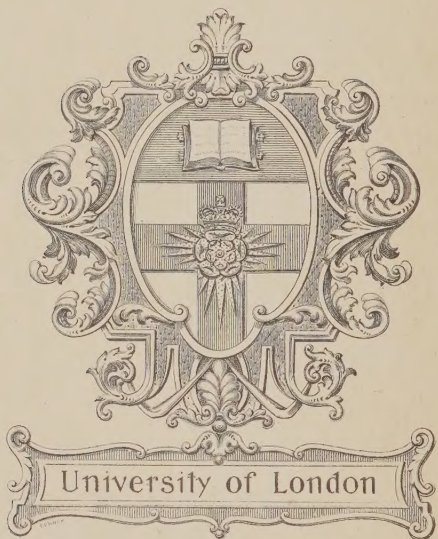


BIRKBECK COLLEGE CENTENARY LECTURES

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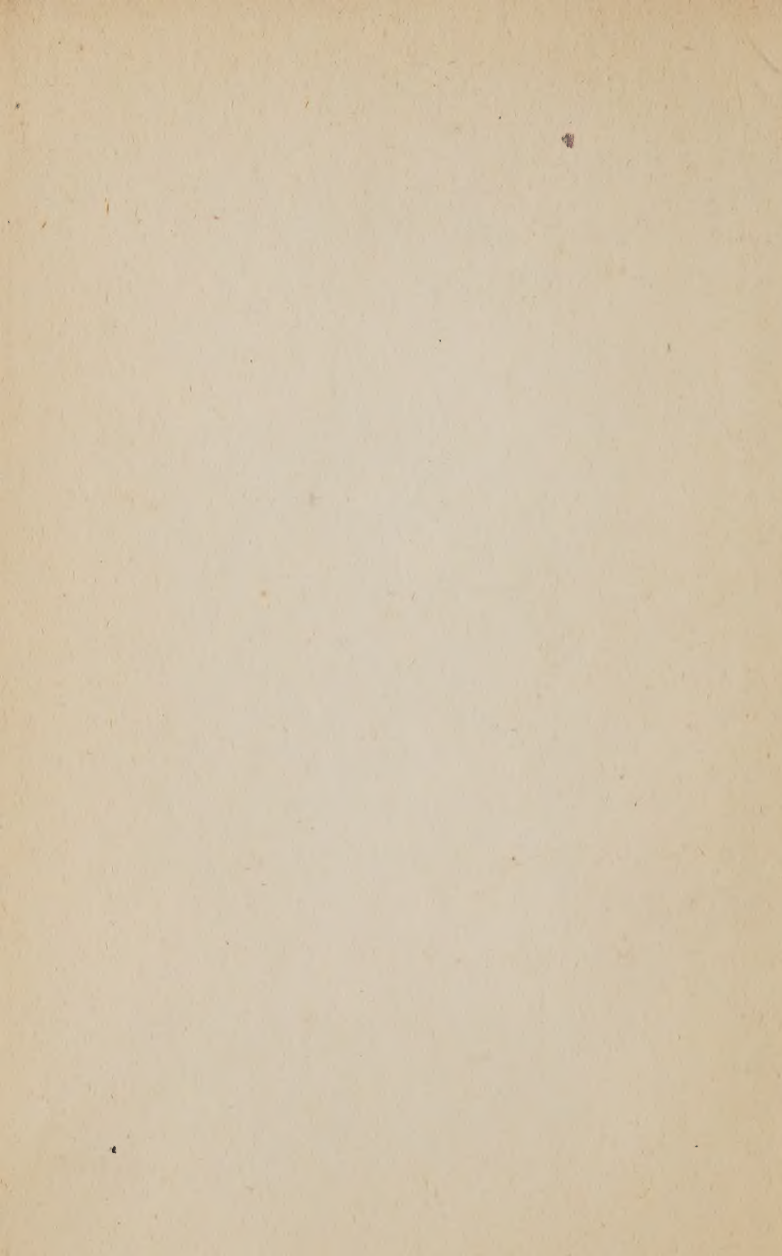


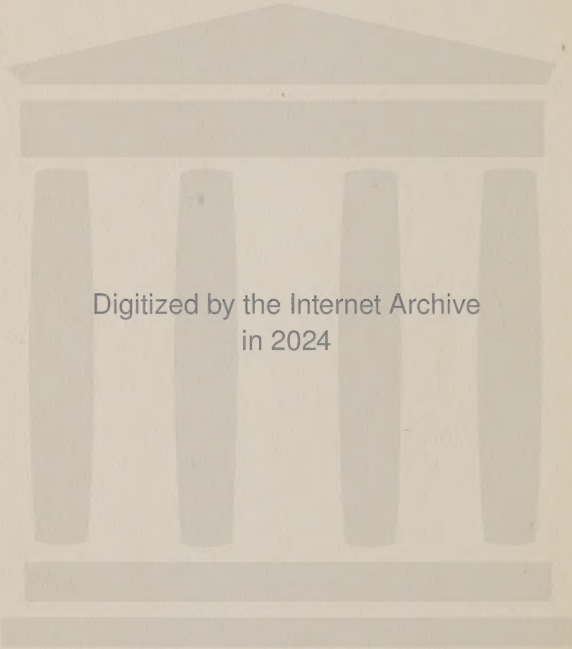
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FOR REVIEW

BIRKBECK COLLEGE
CENTENARY LECTURES

A SHORT HISTORY OF BIRKBECK COLLEGE

(University of London)

By C. DELISLE BURNS, M.A.

Lecturer on Philosophy, Birkbeck College

A deeply interesting record of a century of educational achievement. Founded in 1823, Birkbeck College began its career as the first Mechanics' Institute. Here is told a wonderful story of adaptation and progress until the inclusion of the College in the University of London.

With a Foreword by the RT. HON. VISCOUNT HALDANE OF CLOAN, O.M., F.R.S. Small Demy 8vo, with eight illustrations. **5s.** net.

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BIRKBECK COLLEGE CENTENARY LECTURES

A COURSE OF LECTURES GIVEN
AT THE COLLEGE IN CON-
NECTION WITH THE CELE-
BRATION OF THE CENTENARY

WITH A PREFACE BY THE
RT. HON. J. RAMSAY MACDONALD, M.P.

LONDON
UNIVERSITY OF LONDON PRESS, LTD.
17 WARWICK SQUARE, E.C.4

1924

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MESSAGE FROM HIS MAJESTY THE KING

THE following message was received from His Majesty the King in connection with the celebration of the Centenary of the College :

BUCKINGHAM PALACE,
31st March, 1924.

“ I recall with pleasure that it is one hundred years since the Duke of Sussex laid the Foundation Stone of the London Mechanics’ Institute, which was the inception of Birkbeck College. In 1885 the present building was opened by my father, then Prince of Wales, and to-day Queen Alexandra and the Queen and I are proud to be its Patrons : thus, throughout its life, there has been a personal association between the College and successive Members of my Family.

“ I congratulate all who are celebrating the Centenary of the College. The distinguished names borne on its Roll of past students, some of whom are present to-night, testify to its efficient system and work.

“ I earnestly trust that Birkbeck College may continue to prosper to the ever-increasing advancement and benefit of generations to come.

“GEORGE R.I.”

PREFACE

I CANNOT refuse, owing to the debt I owe to the College, the request that I should write a few sentences to introduce these chapters which tell of the progress that has been made during the hundred years of the life of Birkbeck in the aims and the studies which were so dear to the heart of its founder. The College was founded when natural science was being endowed with new life which, reacting on men's curiosity, made them pursue knowledge with a religious fervour. The political and theological interests of the time linked this up with democracy, and a small, perhaps, but certainly not inconsiderable, section of workmen responded to the intellectual movements and sought opportunity to share in them. Thus, the Mechanics' Institutions, of which Birkbeck became the chief, arose. Science was simple and stimulating. Its revelations were both startling and fresh; the controversies it roused were popular, and the prospects it opened out were inspiring. In due time, education was

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not only brought to every door, but to take its opportunities became compulsory. The Mechanics' Institutions began to be outlived, many of them disappeared, and some, like Birkbeck, keeping in touch with the changes, were merged in the organisation for higher education. To evening classes they added day ones, and their lecture-rooms became filled with students other than those whom the love of knowledge brought there for an hour or two a week after their day's work. To supply the need of the old type of workman student, who had no intention of becoming professional, such bodies as the Workers' Education Association were formed, and the Universities, becoming aware of their duties to the masses of the people and of their responsibility to provide a general culture, started Extension Lectures and provided teachers for popular classes. Thus we have adapted ourselves during a century of remarkable progress in scientific knowledge and educational achievement to the continuing needs of the ordinary people for enlightenment and intellectual stimulus.

The fear is sometimes expressed that with specialisation in the sciences and the drain upon the vitality of our people owing to the conditions of modern industry, the majority of men will lose the curiosity and the intellectual energy which

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lead them to leisurely strolls in the domain of science and other realms of knowledge ; that the *Popular Educator*, Chambers's *Papers for the People*, *Science for All*, do not only belong historically to times that are past, but that the condition of mind which made them successful as publishing enterprises no longer exists ; that the founders and the frequenters of Mechanics' Institutions belong to dead or ageing types of men. I do not believe that that is true. When education (as it is called) is given to everybody, no doubt much of its seed falls upon stony and barren ground, and its fruits are hard to find afterwards. That must be so whilst social, and especially home, conditions remain as they are, and schools are crowded and teachers treated and trained as they are. But we are steadily approaching to a knowledge of what the science and art and meaning of education are. We are discovering pardonable and inevitable mistakes, and are finding out the relations to life and to psychology of our educational methods and organisation.

In this discovery one great fact illustrated by institutions like Birkbeck College should ever be kept in mind. There will be no education till by the processes of education itself curiosity is aroused and a will to be educated is created. The youths

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who went to Birkbeck when I first entered its doors were sacrificing something to go there. They had the will to work, and if the standards they attained were not high in an academic sense, they formed a character which welcomed work and produced minds which were liberal to reason and disciplined by study. People who cannot push their way through thorn bushes cannot go far on a smooth road. The selective process may have been hard and the rejected ones may have been hardly treated. We may now be able to give more chances, and the road may have been broadened with the years. But the pursuit of knowledge and culture must for ever entail hard work and disciplined drudgery, made light only by the stimulus which every step onwards gives to further exploration. It is right that opportunity should be given to all to be the best they can be, but the way of education ought never to be made a way of entertainment or of formal or mechanical pursuit. That only dulls and softens the mind, which needs bracing stimulation to grow in power. The Mechanics' Institutes can never be blamed for destroying human material or for giving false ideals. There was a will in them, and that will we must train and preserve in all who enter the doors of our schools and colleges. I hope sincerely that in its

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more academic robes Birkbeck College may continue the fine work it has done for the pilgrim student who seeks knowledge and the power that comes from it.

J. RAMSAY MACDONALD.

10 DOWNING STREET,
2nd June, 1924.

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PROGRESS IN PHILOSOPHY

By the Right Hon. VISCOUNT HALDANE OF CLOAN,
O.M., K.T., F.R.S.

PROGRESS IN PHILOSOPHY

LADY RHONDDA, Ladies and Gentlemen, you have asked me, as your President and an old friend, to come here to-night and endeavour to deliver to you a centenary address at the College. Well, the time is one that is full of topics. My old friend, Lord Birkenhead, the other day at Glasgow, rather trailed his coat to me. He spoke of me as an idealist. That was not very provoking, because I am an unrepentant and keen idealist and not to be deterred by reasoning of a mundane kind. I believe that men and women think in Paris, in Berlin, in Vienna, in Rome, in Washington, in London, much more alike than they think differently, and I believe it to be one of the great duties of those who are responsible for the higher learning so to spread intelligence of the wider character that we shall understand each other despite divergence of nationality. I think that progress could be made with these things if there were enough intelligence about higher topics. I need not say I do not mean philosophy only, but I do not shut philosophy out. On the other hand,

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I quite agree with Lord Birkenhead that one of the disagreeable necessities which we still have is to see that we are properly defended. It is not a topic which I have in the past wholly neglected, but it is not a topic with which I am concerned to-night, because it is the wider outlook which will take up such time as I have.

This College is charged with a special mission. It has got to bring to those who are busy during the day, but can come in the evening, university knowledge of that higher type of which I am speaking. It is a hundred years since that remarkable man, George Birkbeck, came from Glasgow—where Lord Birkenhead was speaking—and took counsel with friends here. They were remarkable men, those he consulted. There was George Grote, Henry Brougham, Francis Place, and there were others. They resolved that it was a deplorable thing that so many people in this country should be uninstructed in the mechanical arts. There is nothing like a beginning. That was their beginning; they founded in 1823 a Mechanics' Institute, and from that Mechanics' Institute has developed the Birkbeck College. Much water has flowed under the bridges since then, and the Birkbeck College is already an integral part of the University of London. When that University develops itself out of the

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colleges and becomes a great unifying factor for university life in the metropolis, then, I think, you will find that the Birkbeck College will go on with unexpected developments of its own, inasmuch as it reaches a class who must now have university life made accessible to them but who cannot all of them come to it during the day. In the report of the Royal Commission on the University of London, of which I was Chairman, we made that principle quite plain, and it is now coming slowly to fruition. The University is taking a long time to develop, and that need not of itself make us uneasy. It is in the colleges of London that the strength of the movement resides, and that movement will so spread itself as to embrace the whole of university life within its ambit.

This College has passed far beyond the conceptions of it which were formed by George Birkbeck and those who worked with him. It is now a College for the various kinds of university learning. It is a university in two senses. First of all, in the sense in which Dr. Rashdall, the Dean of Carlisle, has used the expression in describing the universities of the Middle Ages, "a place where a large number of students congregate and exercise a very great influence on the shaping of the courses which they need and on the ideals which are put before them."

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And, secondly, a university in that other sense, in which a university is a place in which knowledge is looked at as an entirety, as having many sides and many subjects, a university which cannot be complete unless it takes account of humanism as much as of science and of all the various branches which belong to the Tree of Learning.

To-night there is an opportunity of surveying learning in that larger sense and meaning, and of seeing what it means and what holds it together. It has many sides. There is the æsthetic side—there is poetry, there is art, there is music, there is architecture. There are other things which belong primarily to the domain of feeling. On the other hand, at the other extreme, there is science, and one of the questions which has always to be borne in mind is whether there is such a gap between science and the æsthetic side, which I will embrace for convenience under the collective term of “humanism,” which covers all literature directed to form and beauty; whether there is such a gap as makes it wise for us to isolate them or try to treat them as separate. I do not myself think so, but then I am what is called a philosopher, and a philosopher is a person whose province is to try to survey the whole and to do what, of course, is in practice quite impossible, to take all knowledge

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for his province. My more modest rôle is to-night to speak to you of what I seem to find in knowledge regarded as a whole, which binds it together, which makes its various sides inseparable, and which produces an outlook from which you can survey both humanism and science, and survey them as belonging to one whole in which they can be distinguished but cannot be divorced. Anybody who does that is bound to be influenced very much by his own notions, which he may have taken a lifetime to come to.

But I am going to speak to you to-night in a sense to which I have been brought by a good many years of study, and which perhaps is not a usual sense in those who approach the question whether there has been progress in philosophy. If philosophy is the visualising of knowledge as a whole, people ask "What do you mean when you say that?" They point to the history of thought, and they say, "You see system succeeding system and throwing its predecessors over. You see contradiction on the top of contradiction, and how can you point to anything firm or steady?" Well, in the case of humanism at least, we apply a standard which meets that sort of doubt. We do not ask whether Homer or Shakespeare was the greater poet or whether Goethe stood on a parallel with

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them, because we say their excellences were excellences of a different kind, excellences not of quantity which you can measure, but of quality which cannot be measured, quality so perfect that in the great poet of genius we can see nothing beyond, and we say that qualities of different kinds are appropriate to different ages and to different sets of circumstances, and therefore the question whether there has been progress in humanism, for instance in poetry, is an idle question. You may get what you regard as the very highest in some poet of your own time, and yet you may say the highest in content, not the highest in perfection of form. You may turn to a Greek statue, you may turn to Greek architecture, and you may say, "It has never been surpassed, it has never even been reached in the perfection of pure form," but to-day other things must be taken into account, the quality of the subject-matter must be judged. So it is with religion also. It is the question of quality that determines in the end. You cannot take a measuring-rod and apply it, or put these things into scales, because the differences between them are not quantitative; they are qualitative.

If so, there is a great side of human thought which cannot have the question whether there has been progress in it answered rationally if the only

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test is to be the balance and the measuring-rod, and when you go back into history you find what you suspect confirmed. We have gone back to the days of the Greeks sufficiently to see how much we have to learn from them, but we have not yet gone back to the modes of thought of the East in the same thorough-going fashion. Yet any of you who read Professor Radakrishnan's new book on the *History of Indian Philosophy*—the history, that is to say, of Indian thought—will find that that highly cultivated writer, who is versed in the things of the West just as in his own things of the East, shows that a thousand years before Christ there were conceptions in Indian thought which were comparable to those which came six or seven hundred years afterwards in Greek thought, and which we have at the present time. So far as the mere range and greatness of thought is concerned, what you have in the Upanishads, and in some of the teaching of Buddha and in some of the subsequent teachings of the Hindu leaders, stands just as high in point of quality as anything that we have had since. It is differently fashioned, but that must not lead us away from the recognition of its greatness.

Accordingly the test of whether progress has been made in thought is a collective test, which is

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extremely difficult to apply unless you bring to bear the very widest outlook and go far beyond mere observation and experiment and the measurements which depend upon them. Philosophy has been defined, and I will take the very familiar definition of it as a good enough one for to-night, as the thinking consideration of things, meaning things taken in their largest and fullest aspects, putting aside what is irrelevant. If you take that standpoint and turn to science, you find undoubtedly that great progress has been made in science, but the progress is clear because the standards are different. In the case of science it is the balance and the measuring-rod which you apply : and yet not only these, because we live more and more in a time when scientific methods are determined by new conceptions which give new meanings to things. We have on this platform to-night one of the most distinguished thinkers in the world on the subject of these new conceptions which are transforming physics. Professor Whitehead would tell you how great the change has been. A few years ago nobody dreamt that it was our mode of knowledge to partition up time and space relations differently according to circumstances, and that consequently when we betook ourselves to the observation of things that were very great, either

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in the rate of motion of electrons or in the movements of the heavenly bodies, we should have to bring in corrections which we could neglect under our everyday conditions on the earth, where we are practically all alike, but which make enormous differences when you get to these vast velocities. That has involved a new science, one may call it so, new mathematics and new physics, of which Professor Whitehead is one of the leaders and masters. I will say no more on the subject in his presence excepting that new conceptions—because new conceptions they are—have entered into and are transforming our scientific outlook.

You have the same thing with the atom. Who would have believed, before the war, that the atom was not the little, hard, indivisible thing that we all took it to be, but that it was really a constellation like the solar system? And yet mainly during the war that was discovered and has been brought quite clearly to light. What transformations that, taken along with relativity, must bring about in the end in our vision of things, it makes one shudder to think. The task of mastering it and expressing it clearly is so great.

But that is not the only change that is going on. First, surgery was transformed, and now medicine is being transformed. In short, the

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twentieth century has been one of the most fertile scientific centuries that the world has seen.

These things bring one up to another set of questions. Bacon told us to divert our minds from the methods of philosophy as he knew them in his time, and he was quite right, because the philosophy of those days led people away from observation and experiment. Bacon was not himself a great experimenter. He did not add anything material to physical knowledge, nor were all his methods good methods. They were often too rigid. He sought to shut up the objects of knowledge within certain frameworks outside of which he thought there was nothing intelligible, and indeed he himself said somewhere that his mission was to sound the clarion but not enter into the battle. That is just what he did in science. He directed us to new methods, the methods of observation and experiment, but he did not himself enter into their application. He would have been, I think, very much surprised had he lived to see what these methods were leading to to-day, because what we are confronted with is that instead of the object of knowledge being something quite fixed and quite independent of us, in observing which we need take no account of ourselves, in truth and in fact the observer and what is observed are not

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really separate. In other words, knowledge enters into reality. I shall have to come back to that, but it is not very difficult to take a homely illustration of it.

Suppose a black beetle were suddenly to come into this meeting. What would he think? He would think it was a very odd and perilous place, and he would not like it. So many rough things moving about might stamp on him, and as for the meeting itself it would convey no meaning. He would observe with all the sense of reality of which a black beetle is capable, but it would not convey much of the reality which you and I think of in this meeting. Suppose a dog came in. He would see a number of people sitting about, apparently doing nothing, and inviting him to come up and put his paw upon their knees, speaking from the dog's point of view. Or perhaps he might be like the cat at the Café Royal the other day, he might attack somebody. The dog would make very little of the meeting. He would see certain people, whom he would recognise as beings of a different kind from himself, disporting themselves in what would seem to him a very dull and arbitrary fashion with no rationality in it. But he would not take in that there was a meeting. In other words, there would be no meeting for the dog any more than for the

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black beetle, although the level of intelligence of the dog would be rather higher.

Then we come to ourselves. There you are, all sitting each with your own optic nerves and your own retinas, with sensations of sight and sound impinging on your visual and auditory apparatus, and thereby you each of you get your own private sensations; but nobody can enter into his neighbour's sensations, however much he may think he can. They are the private property of each possessor, and we only get to anything like a common reality by thinking and interpreting in common. That is what is meant by saying that meaning or significance enters into the constitution of reality.

But we cannot stop there. Imagine a being of a higher order, whom I will call, for the sake of convenience, an angel. Suppose he came to the meeting. He might think, "Here are a lot of ignorant, illiterate people making fools of themselves, and what they call a meeting is to me much what the meeting is to the dog." There again the reality as it presented itself to the angel would be dependent on a higher set of conceptions, just as the reality of the meeting as it presented itself to us depended on a higher set of conceptions. I defy you to get out of that. You cannot sit down and think of your aims as though they were there,

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perfectly equipped and all alike in boxes called your brains. In reality and in point of fact it is by your common interpretation and by starting from knowledge that you first get at anything that is real, and anything about which you can make communication to each other. If that is true, then we have been speaking of things, as we very often do speak of things, by reason of our superstitions; we have set up a division between mind and matter, between thinking and reality, which is due largely to our unconscious assumptions and metaphors which result. I am not abusing metaphors. On the contrary, as I shall show you in a moment, they are essential. We cannot get on without them. But what I do say is this, that it is not the real Baconian methods that we have been following in doing these things.

You will see it is understood that I am not setting up any particular form of idealism, or indeed idealism at all. I am going to say to you presently that I think the distinction between idealism and realism is a most exaggerated and ridiculous one. Nor am I advocating the ideas of any particular school. I am only saying that the schools have tended to group themselves into antagonistic sets, which are only antagonistic because they have not recognised that each one of them is concerned with

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what may be a very valuable aspect of things, but may be equally a very partial one. The current idea says that this is the particular and there is the universal, and those who lay stress on the particular and the methods of observation and measurement belong to one class of people called realists, and the others, who believe in universals, carry that so far that they think there is nothing but universals, and they get grouped into what are called idealists. But there is another view which has been more or less prominent from the beginning of thought in the preaching of the great thinkers, and it is this: that we are not concerned with mere particulars or with mere universals at all, that there is no such reality as either, but that what we do encounter when we look at facts is always something concrete and actual. We start from the concrete, and we resolve it into the universals; we find that is not enough, that it does not exhaust reality, and then we try to pursue it into the particulars which we wanted to complete the universals, and so build up the individual.

Let us take any example. Take any science you like. How does it proceed? Its method is to run things to laws, to generalise about them, to classify and name them, and especially it sets up a series of universals. Some people say, "Oh, there is the

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particular beyond." But what is the particular taken by itself ? Something that you cannot even name. Whenever you name it you have imparted to it some sort of universal character. The barest sensation can only be defined if it is contrasted, and can only be described in general language. We interpret to our own case from the particular experience of other people. But in the main and in truth what we are describing is neither individual, neither what is particular, because we never run things down to particulars, nor universal, because you never find universals apart from the particulars which they qualify and enable to be defined ; but what you find is what is individual. What we actually experience in the world is always concrete, and it has in it the elements of factors both of the universal and the particular. Knowledge we pursue by resolving into universals according to our standard of conceptions. The particulars we pursue by finding out where our universals have been insufficient, and then running off further and further from the residuary element which we never can set up as an entity by itself but which is the element in which the method of mere universals is always incomplete. The truth about the whole matter is that we always start from the concrete and, actually, that we always start from what is there in its fullness

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both humanistically and scientifically, and that, if we depart from the actual object, as we must depart in the pursuit of knowledge, we have to betake ourselves to universals, which are never adequate in the complete individuality and therefore to the complete reality of what we are dealing with.

That is why each of you says, "But I see and I hear." So you do. You qualify your sensations by the sort of universals which logically you possess in community with those about you; because of that and because you can use symbols conveying those common universals, you can communicate with one another and have a common comprehension. But you never analyse away your own particular sensations, because they are your own particular sensations and nobody else's, and in themselves are indefinable.

I know perfectly well that that is a very difficult conception. It is not easy to take in just at once, but the more you scrutinise the history of thought, the more you find something of that kind coming up at every turn. You find people running in the direction of the universal; then there is a reaction and people turn to the particular. Then there is a reaction against the particular, because it seems that it cannot be real apart from the universals that define and give it meaning.

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If you take the great systems, you will find that people at different periods of those systems have taken this course, and that as the result at one time stress has been laid on the one side and at another time stress has been laid on the other, and that the higher quality of thought is the thought that does not fall into either of the alternative kinds of abstractions, but which has kept the concrete individuality as the starting-point fully in view, recognised that knowledge is never whole, but that knowledge nevertheless is the only way in which meaning can be analysed, and the gist of its reality brought to light.

If I ask myself what my own experience signifies and pursue this method of looking to the facts, this Baconian method, as I call it, what do I discover? My experience is always individual. It is the experience of an individual who has been sitting all day on the Woolsack in the House of Lords, hearing appeals, then having a meeting, and finally has come here in a black coat and is speaking to you, some of whom have black coats and others of whom have not black coats. The whole surroundings are beset with things belonging to the past as well as to the present, which give it a highly concrete and individual character. And what am I in the middle of it all? I am an individual. What does

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that mean ? I am an organism consisting of so many pounds of carbon and nitrogen. But that is a very inadequate description even from the point of view of the professor of chemistry. I am also a living organism. That will not do, for so is the black beetle ; I am something more than that. I am not comparable to the angel, but a reasonably intelligent person at a level of intelligence which is sufficient to take in this meeting and to try to say something to it which may be unintelligible or may be intelligible.

I have a moral purpose as well as an intellectual purpose. But who then is it that has this ? What is it ? I know there are people who think that somehow or another in a box called the brain there is a substance of some kind which looks out, does vast things, and sets all the rest moving. But there is no warrant for that in science ; nor can I find any warrant for it in observation. What I am is an organism which is more than a chemical compound, which is more even than merely living. It is an organism which itself is intelligent, itself embodies mind. And I see in the organisms in front of me not mere living things, but life that embodies intelligence.

What I am at is this, that if you will stick to the facts they mean really physical existences A, B

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and C. We are minds, and A, B and C are bodies, objects which are more than bodies because they have purposes and wills and because they are individuals, endowed with the fullest reality which the individual on this level can have. It is mind in objective form that we have here, mind in objective form in ourselves and in those we encounter. But when we do encounter the others we do not encounter them in a purely mechanical way. In fact, we do not encounter them at all in a mechanical way. If so, we should think of them as no more than posts on the pavement which we come up towards. It is quite differently from that that we do encounter our neighbours.

I will take an hypothetical illustration. I will suppose that I meet Principal Senter in Chancery Lane to-morrow morning. I should pick him out from all the other people about, and I should recognise his appearance; but that would not be enough. The other people, too, I should recognise as human beings, and why should I pick out Principal Senter? Not merely because, like myself, he felt himself a self and said "I." All the people about say "I." The little boys and everybody around all say "I." To say "I" is simply to be a universal, and you have not exhausted the concrete reality when you are so observing. When I meet Principal

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Senter, what I should look out for is the ideas we have in common. I should think of the history of his past and of my own past. It would be enough that there was this meeting, that we had various knowledge in common about the Birkbeck College, and a multitude of other things bearing upon the University. That would mark out Principal Senter's individuality for me. I should think of him as a person who like myself said "I," who had a house, and a home, and a past with many memories and histories which distinguish him from his neighbours for me, and we should exchange our thoughts on these things by means of words which describe only universals, but universals sufficient to enable us to think in common upon those subjects in a way that brought us sufficiently near.

If that is so, then what is called subject and object, which, as you know, are terribly distinguished in current ways of looking at things, really have not any proper distinction between them at all. They are the two poles in our thought, in our experience, the two extremes to which we converge. If I try to find what is myself, what is the pure subject, I shall soon find that things have vanished into nothing. It is not my clothes, or body, or thoughts, or my memories. I go back to an abstract "I." But when I take it in the concrete, then I find

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what I can recognise as myself and what I can name by a name. So it is with everything, every experience that we have. There are time and space. Real as they are, they have no meaning except for a mind that can apprehend and take them in, and which takes them in in divergent ways according to the conditions. But time and space fall within the object world of knowledge, and the object world of knowledge is nothing apart from the mind that knows it. The animals are intelligent; yes, but they are conditioned by nature. They are conditioned by the circumstances in which they have been evolved and grown up. Darwin has taught us to what an extent nature moulds the individuals that are in it. The animals are at one stage. We occupy a different stage in the world around us, and a stage to which we have been brought by the conditions of evolution and by causes chemical, physiological, geographical, and of other kinds. In other words, we each of us have a definite place in nature, which is due to nature itself. But then nature itself is nothing apart from its place in mind, and accordingly you break down the barrier which seems to have arisen, and you come back to this larger view in which these things are inseparable. Reality is, in other words, dependent upon intelligence.

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That has been put in different ways. There was a great thinker called Kant, who set people reflecting to a very great extent. Kant came after Berkeley. Berkeley thought he had discovered that the world which confronted him, what is called the objective world, had no meaning except as a set of ideas of the mind, which received their order and significance from a definite power outside, which ordered them as they were. Of course, the difficulty of that was that he attributed the significance of the ideas that made up the external world to some cause outside, of which he had no experience ; and, having separated the ideas from their significance, he fell an easy prey to Hume, who said, " But what about this cause ? We have no idea of it. All we have is the ideas, and although the connection between them seems very uniform, we have no warrant for believing that it will continue so to-morrow except habit." Then came Kant. He said, " But the significance of things is inseparable from the actuality." The world that we live in is a world which has no meaning for us unless we conceive it as standing in certain relations which are only intelligible in reference to our own minds, and our own minds are only intelligible if we get rid of the notion that there are so many objects in space acting upon one another, and realise that just as

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the members of this audience have common conceptions which are logically identical because they are not happenings in space and time, so the minds of the different individuals think in common in a fashion which produces that significance, that common orderliness, which puzzled Berkeley, which puzzled Hume still more, but which is restored at once if you have got rid of the notion that things consist either of the same particulars of sense or of the same universals of thought, and learn that really the two are not only in unity but indivisible in the experience from which you start.

These things have been explained better than I am now explaining them in a remarkable book by Professor Whitehead, who is a metaphysician as well as a mathematician, called *The Principles of Natural Knowledge*, and I advise all of you to read it who want to know what the meaning of significance is in interpreting the nature that is in front of you.

Of course, Kant was one-sided. He had the idea that you could take experience, knowledge, and put it on the dissecting-table, cut it up into bits, and just put the bits together again. He thought you could take space and time, and what he called the transcendental unity, and the raw materials of sensation, and, regarding them all as separate entities, conceive a world as constituted by those

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things being put together. That broke down and disappeared, and in the later development of thought in the last century and in this century the tendency has been to refuse more and more to do what Kant tried to do, and to so start from the actual, start from it in its object form and its subject form as inseparable, start from the actual as something concrete, and recognise that if you want to get out of your difficulties, you will have to see that what you go from and what is your foundation is always concrete and individual, and that it is only by abstractions that you can resolve it either into universals or particulars.

That is a mode of thought which is not peculiar to any one system, and I am not putting it forward to you as anything new. I am only saying that it is a quality of thought which you will find from time to time from the days of the Hindus down to our day, appearing and reappearing at periods in philosophy. Every now and then it is pushed too far. One set of people say, "Oh, we will resolve the universe into universals," and the others say, "No, we will resolve the universe into particulars." But the oscillation between those two ways, which is always going on, is also always creating a deeper sense of the necessity of presenting those two extremes and yet passing to the point of view of

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the concrete of which I have been speaking. It is very remarkable how the antithesis shows itself in particular periods. Last century a dominant view was rather that which laid stress on the universal. T. H. Green, a great thinker, even gave some justification for thinking that you could explain the world through universals and universals alone. Then there was naturally a violent reaction against idealism, as it was called, which was identified with Green's way of looking at things, and we have to-day the Cambridge school, which is not wholly insistent upon a single principle, but which in the main says, "Start from the particulars, start from observation." I instance that as the way in which the history of thought has been swayed by antitheses of this kind, always tending to one extreme or the other, and always tending to hypostatations.

The progress, I think, that we see is the growing outlook which tends to take account of both those tendencies and to say that each, taken by itself, is insufficient. There is more and more of that. People are beginning to understand each other better and better as they get to the larger outlook. The controversy between realism and idealism is becoming a defunct one. It would become very speedily extinct if people would not be so extravagant

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in the interpretation they put on each of these names. That is characteristic of the progress of knowledge. The larger the outlook, the more things are taken in, the more easy it is to reconcile them. But it also has another consequence. There is never any finality in human knowledge. We are limited by our place and nature, by our organisms, by the capacity of our brains, by the nature of our senses, and their world that is real for us might be wholly different for beings in some other world with different senses from our own, and putting together their particulars in a different fashion from that in which we do.

What is impressive is that, if that be so, there can be no such thing as final truth. Anybody who thinks he has got final truth has laid hold of an error that is final until he lays his attempt aside. That is the meaning of the very often quoted words of Lessing. He said that if the Almighty offered him truth in one hand and the striving after truth in the other, he would choose the striving after truth. The reason was that Lessing saw there can be no such thing as final truth, and the relation between reality and knowledge is such that they cannot really be cut off one from the other, and that reality is constantly moulding itself as the level of intelligence changes. The true view would

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seem to be that there are different degrees or levels in both knowledge and reality. We have the place in nature which Darwin tells us has come about in certain ways. We are at a level where we do what we do and think what we think largely because of our conditions and surroundings and our past. Others would do it differently. Such is the wonderful power of thought that it can lift us above those things, that it lifts us above them as the price of expressing them in universals which are never wholly adequate. That is why we like to speak in metaphors, and are forced to do so because it is only the metaphors that bring us up to the level of the individual.

More than that, it gives you the view of philosophy that its progress cannot consist of anything that can be measured with a balance or measuring-rod, nor yet is so purely subjective as those impressions of feeling by which we distinguish great poets, great artists, and even great leaders of men when we come across them. The thinking consideration of things, in which philosophy consists, is one which seeks to take all aspects into account, to recognise that there are higher levels, the general character of which we can penetrate by thought, but which we never can render at all in anything else but universals, and which consequently lead back not

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only to metaphors but to humanism, to those ideas of beauty which we can express in poetry and art and what we can express by religion. This gives us a sense of finality which we cannot get otherwise. It is finality which can only be rendered in terms of feeling. It is not science; it is something different, but still it enters into our highest experience just as the particular enters into knowledge at every turn.

If that be so, you need not worry yourselves about the contradictions in systems in the history of philosophy. You will always find that period succeeds period, and brings with it the mystifications which are natural to the tendencies of the time. You will find different phases succeeding one another, but, on the whole, I think you will find that the larger outlook is always developing. What we are taught to do, therefore, is to try to get the widest point of view we can, to realise that knowledge is an entirety in a genuine sense, that all its branches belong to it and are part of its vital organisation, and to see that we have the essential duty of interpreting things as a whole. There is science, art, there are the different levels of science, the different levels in thought, and beyond them we are pointed to what is immanent in us, that which is larger and which is yet required as the

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foundation of the whole—the mind for which the universe and within which the universe and itself both affirm what is revealed to us in the highest art, what is revealed to us in religion, and what is revealed to us as what science and philosophy needed in order to fashion an intelligent basis of things. I am not putting that forward to you as anything to be taken in any particular sense or in any particular way. But you will find, if you take the Upanishads, if you take Buddhism, if you take the great systems of Hindu thought as you have them in Sankhya, if you take it in the Greeks, in the beginnings of Christian times, with the Neo-Platonists, if you take it even with Thomas Aquinas—whom I was endeavouring to fathom not long ago—if you take it in the period of the Renaissance, and the period of Descartes and Spinoza, in the form of modern science, in each case we have a pointing beyond, a sense of incompleteness, a demand for still greater completion. That was why Goethe claimed almost passionately that the man of science required the artist, and the artist required the man of science, and that the experience of life was not complete unless the standard of both was brought to bear.

There is truth in that view, in the outlook of those who say, “Never mind the supposed necessity

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of discovering some particular system which is to represent the truth." There is no such system. It is the study of the whole. It is the striving after truth that is the reality, and that truth is something fixed and final beyond it is a delusion. All our systems and our mode of viewing things are after all partial, and there was much in what Tennyson said, though he ended up with a metaphor which looks more theological than I should like to commit myself to :

“ Our little systems have their day ;
They have their day and cease to be ;
They are but broken lights of Thee,
And Thou, O Lord, art more than they.”

EVOLUTIONARY ECONOMICS

By SIR WILLIAM ASHLEY, Vice-Principal and Professor of Commerce, University of Birmingham

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“ECONOMICS,” or “Political Economy,” is the more or less adequate attempt to find expression in language for actual economic phenomena as viewed by the understanding. It may be held by some to be more than that: to be also an attempt to influence or guide phenomena in the direction of certain ideals—the ideals, for instance, of national power, or maximum production, or social justice. But it is, at any rate, and in the first instance, that: an expression in words for existing phenomena. And that phrase is wide enough to cover all the methods the understanding may use in order to arrive at expression—deduction or induction, analysis or observation, whether singly or in combination.

But it is characteristic of Economic Science—and by science I mean nothing but orderly or systematic statement—that the phenomena with which it is concerned are themselves subject to change, even while under observation. Whether there may not be other sciences of which this is true I will not undertake to say. But it is certainly

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not true, or true in the same sense, of the mathematical and physical sciences. We cannot think of mathematics except as true eternally. Mill, indeed, said that he could suppose conditions in which two and two might make five ; but it has been justly remarked that nobody believes him. The Calculus was as true in the Ark as in a modern University, only Noah did not realise it. This planet, we cannot but think, must have come into existence in time, and with it or before it the chemical elements ; but for vast ages there has been no variation, so far as we know, in the chemical constitution of material objects. The things have remained as they were ; it is our understanding of their composition that has become more accurate. And even biological species, which we have rightly been taught to regard as the product of evolution, have remained unchanged in their structure for millennia. The pig in our pig-sties to-day is fatter and less athletic than the pig which roamed the woods for acorns when the Romans conquered Britain ; but he is essentially the same creature. But with Economics it is not so ; there the evolutionary process has been evident ; and, for that part of the human race with which Economics has, in fact, been most concerned—the part inhabiting what we know as “the Western World”—most marked

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precisely during the more recent centuries. When I speak of "the evolutionary process," let me explain in passing I do not mean to imply any view either as to the essential nature or cause of the process—that is a fundamental problem for philosophy and theology; or as to the means—the extent, for instance, to which such conceptions as "struggle for existence," "survival of the fittest," "adaptation to environment," are applicable in the economic sphere. Above all, I do not now intend to raise the question whether evolution is identical with "progress," however "progress" may be defined. By evolution I do indeed mean more than the bare fact of change; I mean change wherein each new phenomenon arises out of pre-existing conditions and becomes in its turn the soil from which springs the still newer phenomena of the future; so that no stage in the movement exactly reproduces an earlier one, but each carries with it elements derived from its predecessor. But such evolution may or may not be an improvement.

The first coherent body of economic teaching—that of the French "Economists"—was an outcome of the rationalism of the eighteenth century, which assumed abstract human beings and abstract human rights. Adam Smith was debarred alike from extremes of unreality and from theoretic con-

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sistency by his historical reading and by his Scotch caution ; and the full effect of abstraction was not reached before Ricardo's book appeared in 1817, and, thereupon, in a surprisingly short time, an economic orthodoxy came into existence. I do not expect contradiction when I say that it is now recognised, and has, indeed, been generally recognised even in this country, since Bagehot wrote in the late seventies of last century, that the assumptions or postulates of that orthodox Economics were all of late historical appearance in the world of external reality. For let us recall what they are. They are chiefly : (1) *The State* in the form in which it had shaped itself since the sixteenth century ; (2) *Private Property*, including the right of inheritance ; and (3) *Competition*, based on, and exhibiting itself in, freedom of contract. Nobody with any historical knowledge now supposes that what these things, in fact, meant in the heyday of Ricardian economics really existed, to the extent implied by Ricardo's conclusions, in the Middle Ages. Mill, who in this matter went right to the heart of Ricardian economics, did not hesitate to say that " only through the principle of Competition has Political Economy any pretension to the character of a science " ; but even Mill had been breathed upon by the historical spirit which since Ricardo's

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time was beginning to come into existence, and he goes on quickly to tell us that "Competition has only become in any considerable degree the governing principle of contracts at a comparatively modern period." And all that economists have written on Value and Price, and all their efforts to coerce the multiplicity of economic life into a scheme of Supply and Demand, take their start in the Contract chapter of Grotius.

The general proposition as to the comparatively late emergence, or re-emergence, of the conditions assumed by the older economic orthodoxy need not be further argued. I add "re-emergence"; for the Mediterranean world under the Roman Empire was a society wherein conceptions of property and contract had already been born which were destined to reappear as the Middle Ages were drawing to an end, and then contributed to create the soil whence sprang modern Political Economy. But there are two of the ideas with which economists deal on which I should like to add a word or two: they are Capital and Rent. By Capital, the economists have, in fact, meant in the course of their exposition, however they may have defined it at the outset, wealth which, as it comes into existence, and is usable by its owner for other purposes than immediate consumption, he can find

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profitable employment for. As Adam Smith puts it : it is stock from which its possessor “ expects to derive a revenue.” Capital is, in the first instance, investable and, then, invested wealth. That is to say, the conceptions of Capital or Investment mutually govern one another. The fact of Capital and, in consequence, the idea of Capital could, therefore, come into existence only *pari passu* with the coming into existence of actual opportunities for investment. The bearing of this on the thought of the Middle Ages is pretty obvious ; but I doubt whether it has yet penetrated into most of the textbooks.

As to rent—the rent of land—it was in 1815, as Ricardo tells us, that Malthus and West “ presented to the world, nearly at the same moment, the true doctrine.” That doctrine, when abstractly expressed, is independent of ownership : it is a doctrine as to differential advantages which arise in any case from the cultivation of land of different degrees of fertility or other profitable qualities, although these advantages are only called “ rents ” in ordinary speech when owner and cultivator are different persons. But the distinction between the differential advantage itself and the rest of the return from the land would not have been drawn in theory had not the distinction been visibly and

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externally drawn by the circumstance that the differential advantage actually went to some person other than the person who enjoyed the rest of the product. That is to say, the emergence of the conception of Rent was a consequence of the emergence in real life of the rent-receiver, the Landlord. Not the "landlord" in the sense of "the lord of land," as the feudal ages had known him, but the landlord in the sense of 1815 : that is, the out-and-out "proprietor" of land, who (whatever remnants of the older feudal view might impotently survive in the law of real property) now exercised "ownership" or "dominium" in the Roman sense ; sharing the proceeds of his property with no superior, and placing the cultivation of his land, but only if he so chose, in the hands of tenants-at-will. It is true that many of the apparent "owners" of land have been restricted in the use they made of it, by what are known as "strict settlements." But these restrictions were not remnants of the old feudal theory, they were themselves based upon the new doctrine of the right of the proprietor to dispose of the future enjoyment of the land as he pleased.

But the English landlord had come to occupy such a position only comparatively recently. It was not till the middle of the seventeenth century

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that "the incidents of feudal tenure," as they were called, were got rid of: incidents which indicated the existence of an overlord, and a diminution, to that extent, of the power of the "proprietor." On the other side, it was only during the course of the eighteenth century that the conversion of customary tenures into tenancies at will was generally completed, and the *de facto*, and to a large extent *de jure*, division of ownership between landlord and customary tenant passed away. "Ownership" of land, as we understand it, now at last stood forth as a fact; and the economic doctrine of rent was its consequence in theory.

The late appearance of the conditions postulated by Ricardian economics is now, however, as I have already said, commonly recognised by Economists. I want to go on, and to point out that the evolution of external economic conditions, and the subsequent *and consequent* evolution of economic thought, did not cease with 1817. It has continued; and later conceptions, so far as they have secured any wide acceptance, are not, I believe you will find, the result of an acuter analysis of unchanged facts, but the reflex of thought in phenomena newly emerging, from time to time, in the external world.

Let me illustrate this by the doctrine of Interest in its relation to Profit. Adam Smith in 1776

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makes Interest dependent on Profit, in the sense of business gain as a whole. To him the fundamental fact is that Gain can be made in business by the use of Capital. If the user of Capital has borrowed it, it is both just and necessary, he says, that the borrower should pay the owner for "the opportunity to make the profit"; and the part of the product that he has to pay is Interest. "The Interest of Money is always a *derivative* Income."

But when we come to John Stuart Mill in 1848 we get an exposition of Profit, which can indeed be represented as in verbal agreement with Smith, but which really looks at things from a different point of view. Mill, almost at the outset of his chapter, embarks upon an analysis of Profit, resolving it into three elements, which he calls Interest, Insurance, and Wages of Superintendence. Interest is put in the foreground. Not only is this so, but it is explained as the return obtained by the owner of Capital in consequence of bare ownership—of the mere exercise of property rights. Mr. Senior's expression "the remuneration of Abstinence" which Mill calls "well chosen," and proceeds himself to adopt, may have explained, more or less satisfactorily, the origin of the Capital which is invested, and it may have furnished a moral justification of the income; but Abstinence in itself implies

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no further and positive function on the part of the recipient of interest. It is the bare right of the owner of property to invest it as he pleases, and the fact that, as things are, he can thus secure an income, which are pushed to the front. But observe that the interest which is found by Mill to be the first constituent of profit is not the interest which may, in fact, have to be paid by a particular business for borrowed capital, nor is it even the average of the interests actually being paid at any particular time ; it is "the current rate of interest on the best security : such security as precludes any appreciable chance of losing the principal." Mill goes on to explain that by a "best security" he also means one in the finding of which by the investor there is no appreciable expenditure of time or labour. All risk, and all labour of every kind on the part of a user of capital, whether its owner or not, must also receive, it is true, in Mill's view of the matter, a remuneration, or return, in the long run, but this remuneration or return is not in his judgment properly called "interest."

Now, where did this conception of "the current rate of interest," or of "net interest," as some later writers have called it, really come from : together with the associated idea that capital invested in a

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business has, so to speak, a natural claim or right to that amount of reward as part of the realised profits, apart from any additional reward for such other elements as the bearing of risk and the actual mental effort involved in running the business? These ideas did not come from acuter analysis; but from the pressure of the large new fact that, by the time of Mill, the opportunities for investment without appreciable risk or trouble had vastly increased. I think we are not mistaken in finding these opportunities first and foremost in the growth of the English public debt—in those Consols which became a synonym for substantial comfort. The “Public Funds” were six or seven times as large in Mill’s time as in Smith’s, and the accumulation of capital for the purpose of investment had already been greatly facilitated by the growth of the banking system. I am not sure that Mill distinctly realised what was, in fact, influencing him; he does not, I think, mention the English public debt in this connection. But Francis Walker was more conscious of what was going on around him, and did not hesitate to say outright :

“Inasmuch as the possibility of the English Government becoming bankrupt or tending to repudiation is never admitted by an Englishman, the dividends received by holders of ‘consols’ con-

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stitute pure interest, the reward of abstinence.”—*Political Economy* (1883), para. 298.

My argument goes further than this. It is that consols (and other government securities in this and other countries, so far as they approached consols in security and ease of investment) not only were examples of net or pure interest, but actually suggested the conception itself. With it came the further thought that, since capital could obtain that much from the Government without appreciable risk or trouble, it had, so to speak, an initial claim or right to that much in business. Or, to put it another way, capital would not go on being invested in business (the other, safer and easier, way of securing an income from it being, in fact, open) unless it did in the result secure at least that much included in the gross return.

The next important development came a generation later, in 1876, with the Francis Walker already cited. The new note had indeed been struck ten years before by Walker *père*, Amasa Walker; but it was in the writings of his son that it first secured wide attention. It might seem to be only a change in terminology; but, like many changes in terminology, it carried with it a distinct change in emphasis. It consisted in going on to confine the term “profit”

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to the residue, in the return to business enterprise, which remains *after Interest is taken out*. Walker succeeded in impressing on his readers what he called "the function of the Entrepreneur": and he urged—and herein he has been pretty generally followed—that as Interest was the reward of the Capitalist as such, it was better to confine the term Profit to the reward of the Entrepreneur as such. And here it is obvious that the sharp distinction in economic terminology was simply a reflex of a distinction which had become sharp in actual business life. It was Walker's strength, and sometimes his weakness, that he kept very near to the world of affairs. The Capitalist had, in fact, by Walker's time come to be much more evidently marked off from the Entrepreneur. Mill, writing in England in 1848, could say :

"The control of the operations of industry usually belongs to the person who supplies the whole or the greatest part of the funds by which they are carried on."—*Principles*, book ii, ch. xv, para 1.

Walker, in America, in 1876 declared "the assumption that the capitalist is the employer, the employer the capitalist," "monstrously unreal." "Of capitalists under our modern organisation of industry," he said, "but a small minority employ labour : of

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employers few but use capital far in excess of what they own" (*The Wages Question*, p. 228).

Walker's treatment of Profit is significant not only of the growing availability of capital to those who can use it, it is significant also in the emphasis laid on the other side—the Entrepreneur function. It was in a curiously slighting, one might even say belittling, way that Walker's predecessors, Adam Smith and Mill, had spoken of the economic services of the employer: a characteristic inherited, with a good deal else of the older orthodoxy, by Marxian socialism. Adam Smith speaks of the employer's task as merely one of "inspection and direction": and that he does not regard "direction," as he uses the word, as calling for any very high mental qualities is made clear by his sweeping statement that "in many great works almost the whole labour of this kind is committed to some principal clerk" (*Wealth of Nations*, bk. i, ch. vi).

As Smith also speaks of the "wages" of such a clerk as expressing the value of this service, and elsewhere describes employers as "superintending" the employment of their "stocks," we see where Mill gets his "wages of superintendence" from. Mill had scanty intercourse with the business world outside London banking circles; and the movement of his thought, so far as "the theory of distribu-

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tion" was concerned, never got out of the original Ricardian atmosphere. Thus we must explain the remarkable fact that, as late as 1848, Mill had reached no deeper and more positive conception of the functions of the modern business man than that of "superintendence." He allows that the "control" of a large and complicated concern "often requires no ordinary skill"; but, in general, the quality called for, even in large and complicated concerns, is what he calls "great assiduity." Compare such language with the glowing descriptions of the Entrepreneur in Walker. Surely the explanation is simply this, that between Adam Smith and Walker—and indeed for the most part since Ricardo—the "Industrial Revolution" had been accomplished, great manufacturing industries had come into existence, vast areas had been opened to trade, the wind of competition blew far more keenly, the opportunities for gain and loss from the employment of labour were immensely more extensive. The fact, then, is not that Walker saw things to which Adam Smith's and Ricardo's eyes were blind; but that he saw things which, in their time, were not there to be seen.

As Walker left the problem, Profit, i.e. Pure Profit, was the residual share remaining to an Entrepreneur after paying out of gross Profit (or

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allowing to himself, if owner) Interest on Capital, together with the wages of his labour. The "residual share" was fixed by nothing but the size of the residue, after Interest and Wages of Superintendence had been deducted. It was compared with Agricultural Rent in the Ricardian sense: called a "Quasi-rent"; and looked upon as equally a differential phenomenon. Its amount was determined by the Entrepreneur's ability to cope with circumstances, just as the amount of rent was determined by the degree of fertility or nearness to markets.

Later writers have not generally accepted this view, and the reason will be discovered if we pass over another fourteen years and come to Marshall's *Principles*, which appeared in 1890. The main reason, we can have little doubt, was the advent, in the intervening years, of the limited liability joint-stock company. As Marshall justly observes, the rise of the company form of doing business has created "a new distribution of the various parts of business management" (*Principles*, 4th ed., p. 382), and this changed situation was bound, in no long time, to suggest its appropriate economic statement. In the joint-stock company Risk and its reward, if any, has passed over from the actual directors or managers to those who contribute the capital and

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receive its interest—i.e. to the shareholders. The actual guidance of the business has passed to directors and managers who are paid for their services. If for “Superintendence” we substitute “Management”—as a term wide enough to include all stages and grades of business control, the experience of joint-stock companies certainly seems to teach that Management has its price, and that Cost of Production may properly be regarded as including “the normal supply price of the ability and energy required for managing business” (ibid., p. 688).

This was the position reached by English economic theory in 1890. I do not myself regard it as quite satisfactory: it left still obscure the question of the nature of the exceptional gains of exceptional ability—if, over a long run, they do exist in any industry or country; or rather whether, under competitive conditions, there does exist any residual, purest of pure and nettest of net, profit of *Unternehmergewinn* when all the other elements, including Management, have been deducted at their market price. And it is open to a still more far-reaching criticism of which I shall speak later. But, so far as it went, Marshall's teaching was a valuable amendment of Walker's doctrine.

And the amendment did not occur to Walker himself simply because the joint-stock company did not exist in America in any very conspicuous way

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when he was writing in 1876. You may read the two vivacious and stimulating chapters on the Entrepreneur in his *Wages Question*, and not discover from them there was such a thing as a corporate employer; the employer is throughout spoken of as a physical individual. The joint-stock method had indeed been permitted by State laws in America some years before; but "the modern development of large-scale production" in America did not begin till after the depression of 1873-9; from which time onward, as we are told by an excellent authority, "corporations embodying the principles of limited liability, *delegated management*, and indirect ownership became increasingly prominent."¹ Even when Marshall wrote in 1890 he could only say that "the joint-stock companies in the United Kingdom do a *tenth* of the business of all kinds that is done in the country." I do not know whether there are any trustworthy computations for our own country and our own day. Of course, in the United States :

"the statistics of corporations have become in recent years very nearly synonymous with those of the business interests of the country, as distinguished from agricultural and professional activities."—Friday, *Profits, Wages, and Prices* (1920), p. 25.

¹ Ripley, Introduction, p. ix, to *Trusts, Pools, and Corporations*, 1905.

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I do not propose to take you through all the other rubrics of Political Economy, and show the effect upon them of evolving external conditions. But there is one topic where the consequences in the current presentment of Economics of the altered environment have been so remarkable that I cannot refrain from speaking of it; and that is the topic of Population. From the time of Malthus down to that of John Stuart Mill the minds of English economists were absolutely obsessed by the spectre of a growing population. In their eyes it was the *causa causans* of all other economic phenomena: the "Progress of Population" came first, as cause, and then the "natural course of rent, profit, and wages" followed as the inevitable sequel. When, however, we come to Marshall, in 1890, we find that Population has quite lost this central position. There is, indeed, a chapter on Population; but the thought of its "progress" no longer haunts us. The greater part of Marshall's exposition of "Distribution" can be read without coming across the most attenuated ghost of it. In a very typical outcome of Cambridge, Sir Sydney Chapman's *Outlines*, published in 1911, Population does not even appear in the Index! Now this is not because the Malthusian "Principle of Population" has lost its logical force. It is as true now as it was

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in 1798, or as it was in 1857 when Cairnes expounded “the logical process by which Malthus established it,” that “population tends to outstrip the means of subsistence,” if only we judiciously interpret “tendency.” What has happened is that the facts which suggested and were mirrored in the *Principle of Population* have passed away. In the first place, though population has continued to grow in England at a rate which must still be called rapid, it has never since grown so rapidly as in the decade in which Ricardo wrote. From 1871 down to the great war the rate of increase declined or remained stationary every single year. And, in the second place, the development of means of transportation in the second half of the nineteenth century has provided this population, whose rate of increase has meanwhile been slackening, with supplies of food vaster than anything dreamt of by the writers of the first half. The economists of that period were in favour of free trade in corn, in order to equalise the price of food in this country with that on the Continent. Some thought it would do this by sending up the price of corn abroad, others by sending down its price at home. But all thought this equalising effect would be effected by the movement of comparatively small quantities. Joseph Hume, in 1833, suggested that the amount might

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be as much as one-twentieth of our consumption. Porter, in 1836, headed his chapter on Agriculture with "The Impossibility of importing any Large Proportion of Food for the Population." Fifty years later the whole outlook was naturally quite different. It may be argued, forcibly enough, that the opening up of virgin soils has only temporarily suspended the "pressure of population"; but readers gave up being interested in "the pressure," the economists themselves gave up being interested, and the Principle of Population fell into the position of some theological doctrines: it mustn't be denied, but it need not be asserted. Whether under present circumstances a Cambridge Economist will succeed in getting us not only to assert it, but also to be influenced by it, remains to be seen.

I do not intend to say much about economic teaching later than 1890. But we cannot suppose the evolutionary process in things economic came to an end in 1890: and without being so bold as to give my own opinion as to any suitable new formulation, I may venture to indicate some of the directions in which new phenomena may be expected to give birth to new theoretical ways of looking at things. I will mention five.

1. Modern manufacturing development means in the main the extension of the cycle of production

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—usually in time, but frequently in the number of stages. The essentially “roundabout” character of capitalistic production was discerned early; its vital significance could only be fully appreciated in the Age of Steel and Electricity; and it was natural, therefore, that it should not be pushed to the front till the time when Bohm-Bawerk felt moved to write on it—about 1888. I think it is going to have a considerable effect on the study of the relations between Capital and Labour, and of the alternation of periods of prosperity and depression.

2. The enormous increase of capital fixed in plant has caused the element in the expenses of production represented by overhead charges to become a leading consideration, perhaps the leading consideration, in manufacturing policy. This, again, could not be generally true until industry had entered fully into the present era of heavy mechanical equipment. And I suspect it may have far-reaching effect on our teaching as to Price.

3. In the time of Adam Smith “Parsimony,” in its ordinary sense, was still the main source of business capital. Senior, sixty years later, substituted “Abstinence,” but still implied that this always meant a certain personal merit which deserved a “reward.” McVane, in America, forty

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years later still, tried to get rid of all moral implication by substituting the term "Waiting." For a generation, now, a school of economists has treated "Waiting," with a capital initial, as an entity of which there is a supply and demand and a normal price. But the actual formation of Capital in large masses to-day is very different, in appearance, at any rate, from the old individual Abstinence : it takes, for instance, especially in America, largely the form of the reinvestment of non-divided profits by joint-stock companies. It is not unlikely that Waiting will come to seem so inappropriate a term that it will join Abstinence in the cold shades of disuse.

4. The clear-cut distinction between Land and Capital has always been a little difficult to maintain, since, or in proportion as, the use of land has been commercialised. The discoveries of Agricultural Chemistry and Biology—that the powers of the soil for the purposes of tillage are not "inexhaustible," that the elements removed by cultivation have to be replaced by fertilisers, that, in brief, agricultural land tends more and more to become a manufactured article—will, it may be conjectured, still further weaken the distinction.

5. The doctrine of currency which has long been orthodox, the so-called Quantity Theory—dates

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from Hume, writing in 1742, when "paper credit" was still a novelty, and when a good Tory like Hume, who hated the Whig Institution, the Bank of England, could speak of bank-notes as "counterfeit money." The quantity doctrine stood the strain of the large subsequent emission of notes; and as soon as notes came, in fact, to pass as freely from hand to hand as metallic coins, most economic writers had no difficulty in extending the use of the term "Money" to include both government and bank issues. But for England that period was concluded by the Bank Charter Act of 1844. The effect of that Act, in no long time, was to put an end to the development of the note circulation—or rather to destroy it; since Bank of England notes are now essentially bullion certificates. Thereupon the commercial community in this country turned in a direction quite unanticipated: it developed the use of cheques. And in 1909 our best known financial writer, telling us afresh "the meaning of money" (Hartley Withers), has no scruples in calling cheques "currency"—a term he uses interchangeably with "money." But since cheques are in practice drawn not only against actual deposits, but against nominal deposits which are, in fact, credits, bankers have regained to this extent what the same writer calls the power of "manufacturing money."

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This proposition is doubtless only true with important explanations and qualifications: still, I cannot but think that the recognition of this fact has only begun to exercise the influence it is likely to have on "the theory of money." It has been, perhaps, the failure to realise adequately the new situation which has caused the remarkable ambiguity noticeable in recent discussions in the use of the term "inflation." However justifiable such a term may be in description of existing conditions, it certainly has not recently carried with it the quite definite and unmistakable meaning it had to those who first used it a century ago.

6. But there is a change of environment of more fundamental consequence than any of these particular developments; and that is the encroachment of combination upon the area of "free competition." When Mill wrote in 1848 the alternative in his mind to "Competition" was "Custom." Custom, he gave his readers to understand, had prevailed in the past; it was even yet more influential than other economists supposed; but he implied it was passing, and was bound to pass, away. Combination he said comparatively little about; but, so far as he did take it into account, he seemed to regard it as the direct opposite to competition. He thought of it mainly in its complete form as monopoly;

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and he evidently envisaged the economic world of the future as a sea of competition with a few little islands of monopoly. He, therefore, had no fears for Economics when he said in the words I have already quoted that—"only through the principle of competition has Political Economy any pretension to the character of a science": for he certainly thought that competition would survive, not only as a convenient postulate for deductive argument, but as the pervading atmosphere of economic life. But, in fact, to-day the industrial world is shot through and through with every degree of restriction of competition—from the slight barriers which individuals or groups manage to erect, to retard or mitigate the pressure of competition, up to the practical elimination of competition altogether. I suppose it is now almost as true to say that our condition is one of various degrees of combination checked by competition, as to describe it as one of various degrees of competition checked by combination. And combination is not something cut off, as by a gulf, from competition, it is something created by competitive forces themselves. Must not this great transformation of the business world also affect by and by the character of our economic exposition?

I will make two final observations. They are

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the two obvious lessons : the duty of charity and the duty of observation. Most of the important economic controversies between reasonable men are to be accounted for by the different facts seen or imagined by the controversialists, and, in particular, by the difficulties inherent in the circumstances that the facts under observation are themselves changing. It is seldom a question of eternal truth, but only of the more or less adequate reproduction in language of a moving external world. And the other duty is equally obvious. Let us get it into our heads that the trouble is often, not that we are not acute enough in our analysis, but that we are not sure of our facts. Before we try to account for or justify some position of affairs, it is usually worth while to stop and ask ourselves what reason we have for supposing that the alleged facts actually exist. The work of observation and generalisation is not easy, but it is urgently required.

PROGRESS OF EDUCATION IN ENGLAND,
1823-1923

By SIR MICHAEL SADLER, K.C.S.I., Master of
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PROGRESS OF EDUCATION IN ENGLAND, 1823-1923

I

THE hundred years which have passed since the foundation of this College have been crowded with changes in the frame-work and responsibilities of English education. In no earlier century of our modern history have the changes in the methods and outlook of education been greater or more significant in scale and scope. Every man and woman in this hall to-night owes something, many of us owe some of the things most precious in our lives, to the new educational opportunities which have been secured through the persistent labours of pioneers in social reform, through the action of Parliament, of governing bodies and of local authorities, and through the outlay of public funds. If the men of 1824 could see what has been achieved they would rejoice at the progress made. We ourselves stand too near to the vast new fabric of English education, and have been too closely concerned in the task of its reconstruction, to venture

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upon any confident interpretation of some of its deeper meanings. Time must pass before the permanent results of this educational revolution can be judged dispassionately. Our successors will measure better than we can measure the quality of what has been gained, the defects in what has been done, the part which these new educational influences have borne, and are destined to bear, in the vast readjustment of English life. But we may be certain that the little band of men who were the first builders of this College would be amazed, if they could now revisit the scene of their labours, at the colossal changes which have taken place in English education—and that they would admire its accessibility, its contact with pupils of all ages and ranks ; its justice to girls and women ; its consideration for the poor and the disabled ; the professional organisation and training of teachers, the multiplication of secondary schools ; the encouragement of the study of physical science and technology ; the part taken in its administration and furtherance by the central government and by the local authorities in town and country ; the magnitude of the expenditure from public funds ; the enlargement of opportunities for university training, both in the ancient institutions and the new. For all these things we are thankful, and,

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though we cannot yet judge their full effect upon national character and welfare, we know that they have given hope and opportunity to multitudes who would otherwise have been cramped and discouraged by the obstacles of a too narrow lot. If the English educational reformers of the reign of King George the First could have been present at the opening of this College and have compared the situation which confronted Birkbeck and Francis Place with the conditions which they themselves had to deal with a century before, they would have had far less reason for satisfaction than the founders of this College would feel to-day at what has come about in English education since their time. The year 1924 has more educational progress to report to 1824 than 1824 could have reported to 1724.

The educational history of England during the last century has fallen into three periods. The first, which extended to the establishment of the Committee of Council on Education in 1839, was in the main an era of philanthropic and religious effort in popular education helped by small State subsidy from 1833. To the devoted labours of the men and women who established elementary schools during those dark years and gave personal service in their teaching and management, we owe a great debt. The second period, which extended from

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1839 to Mr. Forster's Education Act in 1870, was an era of parliamentary investigation, of rapid increase in the number of elementary schools, and of internal reform in secondary and higher education. The third period, which has extended from 1870 to the present day, has seen a rapid increase of educational opportunity throughout the kingdom and a marked growth in the administrative authority of the State in educational affairs. The chief characteristic of the first period was associated philanthropy ; that of the second, educational self-government under the supervision of the State ; that of the third, the slow construction of an educational system more closely articulated in all its parts and more systematically aided out of public funds. From 1870 onwards, and more especially after the Local Government Act of 1888, which led in the following year to the active concern of County and County Borough authorities in technical and scientific education, and thus to the larger and more synthetic duties entrusted to those bodies by the Education Act of 1902, England has had the benefit of Local Education Authorities, which have enlisted the active interest of their districts, and have served as a counterpoise to the centralising tendencies of Whitehall. But all students of English education would agree in cordial acknowledgment of the

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prevailing desire both of the Board of Education and of the local authorities to recognise varieties of type in the schools and to refrain from rigorous centralisation. The black exception of this record of good sense was Mr. Robert Lowe's Revised Code of 1861, the effects of which set back the best influences in our elementary schools for twenty years.

Four great movements have affected English education during the last hundred years. (1) The political and intellectual influences of the French Revolutions of 1789 and 1848, and of the Great War, which is still so near that we cannot estimate its full effects. (2) Religious activities—Wesleyanism, Evangelicalism, Tractarianism, Roman Catholicism, and Positivism. (3) Industrial and commercial developments at home and abroad, with the changes which they have produced in social structure and in imperial obligations. (4) The advance of science and its practical applications.

The main results of the French Revolutionary movements and one of the chief political results of the war were a strong desire for larger opportunities for individual development, and, at the same time, a new conception of national unity to be reached through the reorganisation of society upon a basis of greater political and educational equality. To this movement in its different stages we may trace

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the growth of the democratic spirit in English education, and also the increasing recognition of the intellectual claims of girls and women as well as the demand for opportunities for adult education.

The chief results of the religious movements have been a growth of humanitarianism and a tendency towards greater equality of status and privilege among the different religious communities. Catholic emancipation, the abolition of religious tests in the Universities, and the general movement towards religious equality have produced a revolution in the old standpoints of the State towards education. The increase in the political and educational influence of the Roman Catholic Church is one of the most significant features of English educational history during the last seventy years.

The industrial and commercial developments in English life made the problem of social reform urgent and menacing. It became necessary to protect the educational interests of children and young people against the economic dangers of the factory system. And, especially after the Paris Exhibition of 1867, it was realised that English workpeople and employers should have opportunities of intellectual and technical training comparable to those which had increased the economic efficiency of other nations.

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The main results of the advance of science have been modifications in the curricula of schools and greater attention to physical education ; a profound change in general outlook upon life ; and a double current of political and educational thought—one current tending towards individualism for the preservation of variety in development, the other current leading to the conception of a social organism which in its advance to a higher structure develops more complicated forms of control over the individual units composing it.

The changes produced by these causes in English education have been deep. But continuity of structure has been preserved and much of the ancient tradition has survived. In English education the past lives on in the present.

II

When the nineteenth century dawned, England's destiny had become half-unawares that of the modern industrial State. In farming and in manufacture new avenues to wealth and power had been opened by energy, invention, science, and capital. England's ancient and deeply rooted society was doomed, in part already submerged, by changes in work and in wages which cancelled comfortable custom, shifted families to unfamiliar districts,

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spurred the strong and crushed the weak. The anguish of the new poverty was little heeded by those who felt the glow of a new creative force. It was an age of genius and character which loosened a vast detritus of suffering. England shone with power against a dark background of danger. She was at war on two fronts—against Napoleon for national existence, against poverty for the welfare of the people. Her life-force was gigantic. She had great thinkers, great inventors, great poets, great painters, great captains by land and sea. In twenty years from their first official numbering in 1801 her people increased in number by nearly one-third. Within the same short period Manchester and Salford, seats of the new mechanical industry, all but doubled in size. England was becoming urbanised; the conditions of her life and labour were in revolution; new ideas made new opportunities; the new opportunities made new perils. Certain types of strong men forced their way to the front in private fortune or in public affairs. But many of the peasantry and the unskilled labourers passed by tragic steps into the plight of a proletariat.

The tragedy lay in no one realising in time what the victories of agricultural and mechanical science were carrying in their train. Jane Austen, who had

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the insight of genius, did not see that she lived in a tragic age. Hers were the gifts of Vermeer, of Delft, not of Rembrandt. Legislation, government, and political responsibility lay in hands that for the most part gained from changes which were creating from the first a necessity for new legislative control over cupidity and cruelty, for new instruments of administration and a new spirit in their use, and for the direct incidence of every kind of experience upon public policy. Partly from inattention, partly from blindness, partly from self-interest, partly from ignorance, partly from fear, England did not do the right things when the time had come for doing them. She was deeply entangled in the difficulties of a modern industrial State before she realised what of intellectual direction and administrative equipment such a State requires. A fundamental need of urban and rural communities is an education which inspires, enlightens, and disciplines. Such an education is partly individual, partly social. By the long, slow process of civilisation a settled community may achieve an educated tradition. But for a new community the background has to be made. Through the revolution in manufacture, in transport, in concentration of human lives and in the world-position of her trade, England, as a whole, needed swift readjustment of educational

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influences, and parts of the newer England were disastrously lacking in every sort of education of mind and manners. In matters of health, of employment, of poverty, and of education she needed far-seeing direction by the State. But for a critical half-century she had not the State organisation which she needed and deserved.

The educational power of the older English life was fruitful and penetrating, though unevenly distributed and unsystematic in its manifestations. Like every great habit or tradition, it was closely allied with social structure. It gave scope to individuality, it was rich in genius ; it was part of a social environment which on the whole was harmonious and dignified, diverse and informally formal ; it was in keeping with a prevailing social ideal ; at its points of incandescence it was vigorously intellectual and in some cases creative ; but in the main it was a training of the disposition and of the feelings rather than of the mind. Ancient wisdom persisted in it. It had classical models of excellence. It was elastic enough to admit here and there new and experimental studies. But it was careless of the rank and file. It was not organised. It drew its chief strength from social influence and inherited traditions. It could not be mobilised by any central authority. It neglected girls. It had

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little relation to trade, too little relation to science. It was patchy, unequal, stronger in impalpable influence on style and judgment than in many-sided discipline of the mind. Yet when we reflect what talents it fostered, what genius flowered from its stem, we may well hesitate before disparaging it as an educational atmosphere. Coleridge and Wordsworth, Keats, Shelley, and Byron; William Blake, Charles Lamb, and Charles Dickens; Crome and Constable and J. M. W. Turner; John Robert Cozens, John Sell Cotman, and Peter de Wint; Thomas Arnold, John Keble, and John Henry Newman; Arthur Young and William Cobbett; Joseph Lancaster and Rowland Hill; Jeremy Bentham, Edwin Chadwick, and Francis Place; Richard Arkwright, Edmund Cartwright, and George Stephenson; Edward Jenner and John Dalton—these great names, so rich in their association of varied achievement, show that there was vital educational power in English life during the years which were barren, or almost barren, of State effort in creating and maintaining schools and colleges. If we deny to that power the name of education, may not those who come after us ask whether our own educational efforts have disclosed to a degree proportionate with the nation's outlay men of genius and courage? It was not to the lack of all educa-

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tional facilities, still less to want of stimulus and intellectual incitements in English life, that George Richardson Porter referred when in his book on *The Progress of the Nation*, published a few years after the establishment of this College, he wrote : " The kingdom which boasts itself to be at the head of civilisation has been among the last to make any public provision for the instruction of the people." What he meant was that in England the State had been slow to grapple with a problem which in its modern form cannot be shirked by the modern State. To the modern educational system as we know it, to the educational development which has been one of the distinctive marks of the past century, the action and aid of the State are indispensable. And a hundred years ago, when Dr. Birkbeck, Thomas Hodgskin, Henry Brougham, and Francis Place joined with others in the foundation of this College, the expediency of State action in grappling with educational destitution, and the limits which in its educational efforts the State should observe, were the most harassing of the questions which lay in their minds. They knew from personal experience that there were thousands of skilled though unenfranchised men who by native ability and power of work were highly qualified to profit by educational opportunities which, with judicious guidance and a

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little help, could be brought within their reach. They were not guessing at the need for facilities for adult education. They knew that men were waiting who were worthy of it. But how, and with what limitations on its authority, to invoke the aid of the State in providing schools for those who had no schools and in protecting the welfare of children engaged in labour inhumanly prolonged, was a question not easily answered, because it raised the doubt whether the then existing Government could be trusted rightly and fairly to use great powers of educational control and whether, without a revolution, administrative authorities then in office could be replaced by something more in harmony with what forward-looking men believed to be the general will. Robert Owen, masterly in the organisation of his mills, and convinced that wise and irresistible authority could shape humanity to a higher standard of comfort, culture, and fellow-service, had committed himself to a doctrine of State Socialism as thorough-going as Lenin's, though without a trace of Lenin's cruelty in repression. Thomas Hodgskin inclined more and more to the view that education should be kept wholly free from the State on the ground that, when you once admit the State into the governance of education, you cannot stop the steady increase of its power of interference.

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Brougham took the middle course, and, while deprecating State action in regard to adult education and nursery schools, invoked its aid to elementary education. Brougham carried the day against Hodgskin. But, though the English State has shown so far no disposition to move in the direction indicated by Robert Owen, the cost of education has entailed State subsidy on a scale and with a range far beyond anything that Brougham desired. If England is at heart semi-collectivist, it will be through education that semi-collectivism will set its stamp upon national life. But England is not all of one piece. She has among her citizens those who are highly individualistic in temper and those who are temperamentally collectivist. It is in the play between these opposite tendencies and conflicting ideals that the key to English educational history lies. The English were slow to embrace the idea of State action in education. Our conflicting opinions made us slow. The greater number of us are prone to the patient temper of collectivism. It is this habit of mind which has made the socialistic tendency of modern educational organisation so far from unwelcome that for the last twenty years it has made rapid advance in English affairs. But the individualism embedded in the English character would wreck, I think, any long-continued attempt at

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thorough-going and doctrinaire collectivism in our educational policy.

III

We are not in a complacent mood. Great as has been the outlay which England has made on education during the last twenty years ; noble and disinterested as have been the labours of the public-spirited men and women, teachers, officials, and private citizens, to whom we owe the administrative advance made all along the educational line ; appreciative as we are of the temper of conciliation and adjustment which has assuaged many controversies, we are far from feeling jubilant, nor are we convinced that the great experiment of modern education will give us all that its more sanguine advocates have hoped. Any note of exultation at the progress which has been made ; any self-congratulation, as at an assured victory, over the evils which education is designed to cure, offends us and turns our thoughts to the shadow-side. Hundreds of thousands of individuals indeed have been helped by the new opportunities which are offered by education, now more widely extended and accessible than under modern conditions it has ever been. No one is disposed to underrate the value of this opening of careers to young people of talent and

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industry. On the side of personal freedom there has been undisputed and far-reaching progress in English education. Schools have been humanised. In the education of corporate life they are of unrivalled excellence. There is a happy relation between teachers and taught. Discipline has become more intelligent and humane without being dangerously relaxed. More parents are anxious that their children should have good educational opportunities and are willing to make sacrifice to gain for them a better and longer education than they themselves enjoyed. From Scotland, from the United States, from Switzerland and Germany, from Canada, we English have learnt many lessons and have drawn cogent arguments for educational advance. And a great tide of what is called democratic sentiment has lifted us out of our inertia and above the level of many harassing disputes.

But we are bound to admit that the age of advancing popular education has also been an age of discontent. The history of discontent should be written alongside of the history of modern education. The two are related, though I do not believe that discontent has been the chief cause of education or education the chief cause of discontent. But the atmosphere which produces discontent also produces a desire to furnish an education which, if it

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may not allay discontent, will at any rate remove some of the causes from which discontent springs. And education, if misdirected or unsuitable, may make us discontented with the surroundings of the kind of work we are best fitted to do, without giving us the force of character which conquers surroundings and redeems them.

I suspect that all systems of education organised on a vast scale give to a great many children and young people a kind of education not really fitted to their needs. As these systems spring from an established order and are coloured by the economic and ethical presuppositions of the society which maintains them, they cannot but tend to approve educational methods which make the younger generation more organisable, more disposed to accept the assumptions of the prevailing regime. On this side they are an anodyne rather than a stimulant. When, as is the case to-day, some of the presuppositions of the economic order are discordant with many ethical aspirations, an educational system which is bound up with such a system of economic organisation flags in spiritual power and, except in the direction of career-making, loses some of its vital force. This, I fear, is the hidden trouble in modern education. The vastness of its administrative operations conceals from us some elements

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of inner weakness. The great mass of the system goes forward by its own weight. It grows because it cannot help growing. It impresses us by its size. It forces us to conform to its requirements. But we cannot escape from an uneasy feeling of disappointment at some of its general results.

The trouble, however, has not yet fully disclosed itself. Educational progress on modern lines has achieved very much that we know to be good. But it is also doing much that we feel instinctively to be debilitating. Our perception of this explains our two-mindedness about education at the present time. When we hear it violently attacked we are up in arms to defend it. When we hear indiscriminating praise of it, we become uncomfortably conscious of its defects.

But we are right in determining to go forward. We are pledged, and rightly pledged, to a great experiment. Courage and determination to give the experiment the best possible trial, without false economy and without faltering, are our safest guides. Our successors fifty years hence will judge the results. We cannot judge them. What we can do is to record our gratitude to the great pioneers who led the way and to keep our own minds open and sensitive to the duty of vigilance against the dangers with which huge educational

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enterprises are beset. The chief danger against which we in our time have to contend is the danger of sacrificing the life of education to the claims of examination. The mission of education lies in the awakening of creative powers. Accuracy, punctuality, obedience, are all vitally important objects of its discipline. But none are vital without the vital spark which kindles what is creative in us. To fill the mind with what Professor Whitehead has called inert ideas is not education, but the antithesis of education. And it is very hard for us, whether we are teachers or pupils, to escape from the indirect, as well as from the direct, influence of those examination requirements which can be decorously and most easily satisfied by the administration or absorption of inert ideas.

PROGRESS IN PHYSICAL SCIENCE

By SIR JOSEPH THOMSON, O.M., F.R.S., Master
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PROGRESS IN PHYSICAL SCIENCE

It would be but a poor compliment to the progress that has been made in Physics in a century if one supposed that it could be dealt with, even extremely inadequately, in the space of an hour. I disclaim any attempt to give anything like a complete account of even the most important discoveries that have been made since the establishment of Birkbeck College, but I would just like to express the terror that I felt when I saw this attempt of mine described as an "oration." When Sir Cooper Perry asked me to address you he suggested an informal talk. I see that has been developed by the Press into an oration, but anything less like an oration than my performance this evening it would be difficult to imagine. All I can do is to say a word or two about just a few of the most striking developments that have been made in physics during the last century.

The study of physics makes two appeals to us. In the first place, it increases our knowledge of this wonderful world in which we live. Indeed, I do

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not think anybody who is not a physicist can appreciate the beauty of the mechanism in the midst of which he is living. One sometimes sees a reference to what the writers are pleased to call "mere matter." That always irritates me, because if we understood all that is contained even in a bit of clay we would have revealed to us mechanism of almost incredible beauty and efficiency, and we would be endowed with powers which would revolutionise civilisation. In the second place, the study of physics is of great practical and economic importance.

I would like to begin by contrasting the opportunities for studying physics now and when Birkbeck College was founded. So far as I can make out, the only Physical Laboratory in London at that time was at the Royal Institution. There were hardly any physical laboratories in the country—I do not think there were any. The Universities were very few. There was hardly any means by which a student, who wished to know what seems to us the small amount of physics then available, could get that knowledge. Contrast that with the present state of things. I suppose that there is a University now within the reach of almost every student in England. There is teaching in physics and a physical laboratory

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within the reach of everybody. In those old days there were but few scholarships. Now there are scholarships, I will not say as many as are needed, but I think that now any student of marked ability in physics would be provided with the means for continuing his study and getting the best available training.

The result of all these facilities has been that the small handful of people who studied physics at the beginning of this century has increased to an army. One cannot say that the number of stars of the first magnitude has increased in the same proportion, and it seems to me striking evidence of what genius is capable of that the number of veritable peaks has not increased or has increased but slightly. It shows what genius can survive, because in those old days anybody who wished to study physics had to overcome difficulties that might well seem insurmountable. But though perhaps the great geniuses have not increased, yet their opportunities have increased. Laboratories are now equipped with instruments almost infinitely beyond the capacities of those at the beginning of the century, and though it may be, as I said, that the numbers of originators of great ideas have not increased, yet one thing must be remembered: the speed at which science advances has been enormously in-

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creased. In the old days, when a new theory or idea was originated, it took many long years before enough experiments could be made to test the truth or otherwise of the theory. Now, as soon as these new ideas come forward, almost every laboratory in the country is engaged on researches to test them. The court of justice is hurried up. A verdict is soon arrived at, and if the result is favourable, a weapon of first importance is at the disposal of the man of science. Once one property of matter has been established, it yields ammunition to attack the investigation of other properties, and the result is that the increase goes on in geometrical proportion.

In my opinion, this increase in the number of laboratories must react even upon the most original and greatest of physicists. The mind of the physicist cannot work in a vacuum. It must be co-ordinated with that Nature which he has to investigate. Unless the physicist's ideas are controlled, so to speak, by reality, his efforts will be in vain. Like Antæus, he would lose all his strength as soon as he lost contact with reality. I will not vouch for the truth of the tale about Newton and the apple; but, if the facts are not right, the moral is. The brain-waves do not start by themselves. They require a detonator, and the more experiments

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you can have, the more researches are described, the greater number of sparks there are which may produce the required explosion. Now we have no need to complain about the paucity of the material which is provided. I saw that in the volume for last year of *Science Abstracts* there were 2,500 papers on physics. Perhaps some of us, who have to read them, may think that the stimulus is rather overdone.

I will now turn to the question of the progress of physics. I feel bound to begin with the subject of Heat, because Heat, like you, is celebrating its centenary. This is the centenary of Carnot's book on the motive power of heat. It is also the centenary of the birth of Lord Kelvin. It is very appropriate that those two names should be connected together, because to those two we owe—I may mention along with them the name of Clausius—the modern science of thermo-dynamics. Carnot's work was, I suppose, one of the most wonderful efforts in physics that has ever been made. Carnot began the study, it is true, after the steam-engine had been invented. The theory of the steam-engine or of any engine was quite obscure. Fortunately we are not driven to use only those things for which we have a theory; otherwise I do not think many of us would be living. But Carnot established, in

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the infancy, so to speak, of the subject, an idea and worked it out. He introduced what we know as Carnot's Cycle. He imagined a little engine, not much like anything in practice, but in essentials, in the physical principles involved, identical. He introduced what he called a "cycle," in which a working substance, for example, steam, was made to go through a series of changes, heated, cooled, condensed, and so on, and finally brought back into its original state. Starting from the principle that perpetual motion was impossible, he showed that the engine would have the maximum of efficiency, provided the processes are reversible, that it would produce from a given amount of heat the greatest available energy. In Carnot's time the doctrine of the conservation of energy was not held, though there is evidence that six years before his death Carnot had arrived at the idea of this conservation. But in Carnot's time the idea was that heat was a fluid, so that in any engine as much heat would come out of the boiler as went into the condenser. We know now, of course, that there must be a difference, and that that difference is equal to the work done by the engine. In spite of that, Carnot's idea is so valuable and so true that, when the principle of the conservation of energy was established, it required an almost obvious modification

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of Carnot's cycle to deduce that law which is one of the triumphs of the last century, the second law of thermo-dynamics. That was done by two men, Clausius and Lord Kelvin. It provided, especially in the hands of Lord Kelvin, a weapon of extraordinary power, because this principle of Carnot's cycle duplicates, as it were, a great number of physical discoveries.

Let me give you an instance. Suppose you take as your working material in Carnot's cycle a soap-film. As you know, that soap-film requires less force to stretch it when it is hot than when it is cold. If you put it through Carnot's cycle and apply the Carnot reasoning, it will follow that when that soap-film is pulled out it will cool. So that starting from one result you are led by the use of this cycle to another. With this weapon Lord Kelvin stalked, as it were, through the territory of physics, plucking fruits of great importance which had otherwise been unapproachable.

I turn to another of the achievements of the century, the establishment of the conservation of energy—that principle which has led to such a great increase in the connection between the various branches of physics, and which has helped so much in the development of this subject. As I said, Carnot seems to have had some claim to having

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arrived at it in the six years before his death. His book—he died before he knew what he had done—attracted little or no attention; in fact, it was not understood, the ideas were too novel, and it was a quarter of a century afterwards before its full importance was seen. Others conceived this idea of the conservation of energy, but what I think did most to establish it was the work of an Englishman—Joule. He made a frontal attack on the subject and determined directly the amount of heat produced when a certain quantity of mechanical work was converted into it.

The principle of the conservation of energy was chiefly important because it recognised the transformation of energy. It recognised that energy of one kind, energy of a moving body, could be transformed into energy of other kinds, heat, the energy of electric currents, the energy of magnetised iron, and so on, and that there was always a constant rate of exchange between them. If so much of one disappeared, so much of another appeared.

There is one conception, which is all right from the mathematical physicist's point of view, but from a philosophical point of view was perhaps a little unsatisfactory. That was the idea of potential energy, that if you throw up a stone or a cricket ball into the air, as it loses its velocity, it acquires

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what is known as potential energy. Potential energy was a kind of credit at the bank; you could draw on it again if you wanted it, but nobody knew exactly what had happened to the energy. It was a kind of credit to the body, but, as far as it could be seen, the body had no different properties from those with a different amount of potential energy. In Einstein's theory now that difference is taken into account.

When we make energy the fundamental conception, there is much to be said in favour of regarding it in much the same way as the physicist at the beginning of this century regarded heat, as an indestructible substance moving from one substance to another.

Then there is the production of extraordinarily low temperatures. This century has witnessed the liquefaction of every element known to us. Sir James Dewar will always be remembered in that connection, but I will only refer to the extraordinarily interesting results that have followed the investigation of the properties of bodies at these very low temperatures. For example, we find that some metals get into a state of superconductivity. They conduct electricity so well that if you start a current in them and then leave it to itself, it almost outlasts your supply of liquid hydrogen; it goes

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on for hours, and often the cooling medium gives out before the current.

Another application of first-rate importance of these low temperatures is the production of high vacua. Charcoal, when cooled down to these temperatures, shows an extreme avidity for gases, sucks them in from the vessel in which they are contained, and produces vacua far higher than were within the reach of experiments before this was known. Nearly all the most important and interesting results that have been obtained in recent years would have been impossible if it had not been for the introduction of this method of obtaining high vacua.

Another branch of heat that has developed in this time is the kinetic theory of gases. We have extended greatly our knowledge of minute atoms and molecules. We have counted them, determined their velocities, and so on, and the results are sufficiently surprising. I do not expect to convey any real impression when I tell you that it has been proved probably to an accuracy of 1 per cent. that in a cubic centimetre of gas there are 2.7 multiplied by 10^{19} molecules, or if I tell you that every molecule of air makes on an average one thousand million collisions a second. These numbers remind one of the number of marks in a £.

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It is interesting to note that at the very time when these accurate measurements were being made, when we were measuring or detecting single molecules, a very distinguished chemist said that a time would come when it would be necessary to give up the notion of the molecular structure of matter; that it had not done much for his own subject of chemistry, and he did not see any evidence in favour. He had better have spoken a little earlier or held his peace.

Now I turn to the subject of Light. One of the most important developments there is the progress of that great art of photography. Photography, of course, has its lighter side, but as a means of physical investigation there is hardly anything so important.

It enables us now in every branch of science to get a permanent record. It is interesting, I think, to see what influence the science may have on those great questions of production and so on that are so vital now in this state of the world, but I believe—I say it on the authority of a commercial friend—there are few industries in the world that are involving such accumulations of capital as the industry connected with photography. I am sorry to find it has surpassed railroads in the amount of employment of capital invested.

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Now another discovery that created a great impression was that of spectrum analysis, or analysing the constitution of bodies by investigating the nature of the light they emitted. By means of it we were able to tell the constitution of bodies millions of millions of miles away from us. This produced a great impression at the time, but we have gone further than that now. Professor Zeeman found that the light that a body gave out was affected when it was in a magnetic field. The difference is not one you could appreciate by the eye, but in a spectroscope it is quite evident, so that having a line in the spectrum and knowing that it ought to be in a certain place, and finding it was in another, you could tell what the magnetic force was that was acting at the place of origin of this line. Using this method, Professor Hale has investigated the sun, and has been able to find magnetic storms going on. To examine various portions of the sun's surface and to be able to point out a magnetic storm at a certain place, is really one of the romances of science.

Lately, in the last few years, spectrum analysis has acquired a new importance in interpreting the nature of the structure of matter by the remarkable theoretical investigations of Professor Bohr.

Another great contribution was that of Maxwell

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to the theory of light, and another discovery which, perhaps, the majority of the audience may be old enough to remember, was the discovery of X-rays by Röntgen. That created almost unprecedented enthusiasm for physics. It enabled one to see through a brick wall. Now it has been shown that Röntgen rays are just a kind—I do not mean it in any derogatory sense—of light, of very small wave-lengths, and just as by using ordinary light one can detect the fine structure of a grating or the layers in mother-of-pearl, so with these very fine rays we can detect the structure in crystals where the distance between the atoms is only about one-thousandth part of the wave-length of visible light. It was impossible to detect this by the use of the light we had formerly, but when we get light of wave-lengths which is only one-thousandth part, our wave-lengths become comparable with the distance between the atoms and we are enabled to investigate the structure. We have only time just to mention the work of Laue and Sir William Bragg and others, who unravelled the structure of various crystals and gave us for the first time an adequate conception of the arrangement of atoms and so on in such crystals as a diamond.

Röntgen rays have had one rather disturbing effect. The one thing that did seem certain at the

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beginning of this century was the truth of the adequacy of the undulatory theory of light. That theory was subjected to the most searching tests and most refined experiments. It had predicted results which were so surprising that they seemed impossible, but which turned out to be true. It is not obvious at first sight why, if you take the shadow of a circular disc, you should have a bright point in the centre. It was a very interesting result. When Fresnel's paper was presented to the French Academy it was sent to a referee, and he, with surprising acumen, saw this, and said: "This is evidently absurd: the whole theory is absurd because it is ridiculous to suppose that there can be a bright spot in the middle of a dark shadow." When the experiment was tried properly, there was the bright spot. A theory that has stood a test like that is not given up easily, and one cannot help the conviction that this undulatory theory is a part of the nature of light.

These Röntgen rays have, I say, introduced some very disturbing phenomena. Once the mathematical idea of light was that it was a kind of unbroken front like the rollers in the Atlantic, advancing so that there could be no escape for anything in their way. But now, well, you take these Röntgen rays which produce a far more vigorous result than

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ordinary light and enable you to study their properties more easily, and you find, if you send Röntgen rays through a gas, that those rays will pick out about one in a million million of the particles on which they strike, treat them in one way, and leave the others unaffected. This is very difficult to reconcile with the motion of the unbroken front such as we were accustomed to on the old undulatory theory. It is much more like the results one would expect if one took Newton's Corpuscular Theory. There is a great concentration of energy, just as was the peculiarity of Newton's theory, and I venture to suggest that when we know more about it than we do at present, we shall find that we have the characteristics of both theories present in light. We have a core, something like the one imagined by Newton, surrounded by waves; but these waves have only a small amount of energy, though by their interference they alter the path of the energy of, so to speak, the heart of the rays, the core which produces all the effects that require the expenditure of energy.

I must pass on now to the progress in Electricity, fortunately the greatest advance of all. Faraday's discovery of electro-magnetic induction is so well known that I need not dwell upon it. You know the experiments made by Faraday in the Royal

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Institution. He moved a magnet near a coil of wire connected with a galvanometer and observed that the needle was deflected. That simple observation has been the foundation of some of the largest industries now in the country. We now entirely depend upon currents which are generated in accordance with this discovery of Faraday. In the old days, when I began as a student, you had a nasty thing called a Grove cell to supply current, and really the manipulation of these Grove cells became a kind of nightmare. They gave off nasty vapours. They made great holes in your clothes. Now they have been replaced. I have not seen a Grove cell for twenty years, and I do not want to see another.

Faraday's discovery had not only an enormous industrial effect, but it led to Maxwell's theory of the electro-magnetic field. Maxwell established what are known as Maxwell's Equations, which have been more influential than any equations ever before created. When Maxwell developed these equations, he found that they led to the result that electric disturbances or changes in the state of current or electric force were propagated with the velocity of light, and the natural conclusion was that light itself was an electric wave. Maxwell predicted these waves, but he died before they were

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detected experimentally. Some time after Maxwell's death, Hertz, by a series of remarkably ingenious experiments, detected the periodic type of electric disturbances. That was quite at the end of the last century. You see how rapidly things moved in those days. I can remember the time when we held the record for long-distance waves at the Cavendish Laboratory, when we got one and a quarter miles, and were very proud of it. Now, when you consider the development of Wireless, you should remember that wireless waves were first seen with the eye of the mathematical physicist. Later the experimental physicist studied them, and finally the industrial physicist studied them, and developed the apparatus to such a point that it was a good thing for mankind in general and could make money. I am not saying a word against making money. I think it is to the desire to make money that we owe the fact that these people who develop the invention will risk enormous sums. They do have to risk enormous sums. They have to go through what is not the interesting work, like the pioneer work of the Professor of Physics, but the somewhat dull task of making various mechanical devices, and without any certainty of a result. I think you require a great stimulus for that. I am glad it is provided by the love of money. This

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may be the root of all evil, but it is the root of a great deal of good as well.

This prevalence of wireless is revolutionising our ways of looking at things. We used to employ dynamics to interpret electrical phenomena, but I am not sure that the coming generation will not reverse that process. The whole world now seems to be impregnated with electrical ideas. I especially noticed it in America a few months ago. Even the lift-boy used to come and talk to me about "radio." Probably in a few years we shall be illustrating the principles of dynamics by starting with a simple thing like electricity.

I must just say a word about another application which has led to important results in electrical things : that is, the study of what happens when electricity passes through a rarefied gas. We see there from the light given out and so on that something is happening. When we went into it, we found a very interesting fact, that one of the most potent agents in these exhausted tubes was different from anything that had been recognised before. It is a thing called an electron, whose mass is only about one-eighteenthundredth of the mass of the lightest body known before.

These electrons are everywhere, and everywhere the same. Each atom contains a large number of

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electrons. The modern idea about the electrons is that each atom contains a definite number of electrons held together by a central charge. The study of these phenomena associated with the passage of an electric discharge through a gas has resulted in the discovery of these agents, which seem to be the live end of all atoms and matter. These electrons, which are given out from a hot wire, have led to enormous industrial applications. They are of vital importance in all the apparatus that is used for wireless. Millions of money and tens of thousands of people are engaged now in manufacturing apparatus that will liberate electrons. All that has been within a very few years.

These electrons are the carriers of negative electricity through gas at a very low pressure. All the negative electricity is carried by electrons—all exactly of one kind. When you come to positive electricity, you find an entirely different thing. The carriers of the units of positive electricity depend entirely upon the nature of the gas in the tube, and there is one carrier for hydrogen, another carrier for oxygen, and so on. What is important is that we can, by giving a lot of energy to these positive electrified things, make them affect a photographic plate, and by the amount of their deflection we can calculate their mass, so that we can use this as a

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method of detecting the nature of a gas in the tube. It is an extremely convenient method of analysis. It is more convenient than spectrum analysis because every one of these lines across the positive ray spectrum tells you exactly what its mass is. You do not have to interpret it in the way you do a new line in the spectrum obtained in the ordinary way. This method has led to the detection of many new substances. Take, for instance, the new compound of hydrogen, H_3 . It has detected all those isotopes which Mr. Aston has been working out. It has introduced a new method of chemical analysis.

It has led to this very interesting result, that all the atoms of different elements are made up of units. Prout thought that the atoms were all collections of atoms of hydrogen. We find now that, when the measurements are accurate, the masses of the different elements are all multiples of a unit. It produces great simplification in our conception of the structure of an atom.

I must say a word about another discovery, that of radio-active substances. The discovery of radium by Madame Curie, the discovery of the transformation of substances, and the investigation of them by Sir Ernest Rutherford, have led to results of the greatest interest and importance. They have raised hopes of tapping the atomic energy which will

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make us as gods, able to have an infinite supply of energy at our hand. I am not quite so sure of it myself. If a body is to be a source of this energy it must possess more potential energy than it ought to have : it must be in a condition to go to some other state and liberate the difference of the energy. Those substances which have the minimum of potential energy have got no capacity for radio-activity. It is those substances which have not reached the final stage of smallness in their potential energy that can be radio-active. They have still an opportunity open to them. They have more energy than they ought to have. They can come to a lower stage and give out the difference, and from these we can extract atomic energy. It is not a donation during their lifetime, but is a kind of death-bed bequest. They give it up because they are able to get into another and more stable condition where they have less potential energy. I think, as far as we know at present, the evidence is that most of our elements have got into that last stage : they can go no further. I do not think anybody would say that anything whatever was impossible now, but I confess I do not see any immediate prospect of large sources of atomic energy being liberated from ordinary matter.

There is just one name that could not be left

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out of a review of modern physics. It is the name of the late Lord Rayleigh. Lord Rayleigh would have been one of the greatest of our physicists even if he had not made the discovery of argon. He enriched almost every branch of physics by his contributions.

Now I am done, and I have only to say that great as has been the progress in physics during the past century, I think there is every prospect of it being greater in the century to come. I remember that at the time when I began the study of physics there was a kind of pessimism about. We were told that all the great discoveries had been made, that all we had to do was to get more accurate values for certain physical constants. I never believed that was right. Nature contains a great deal more than we have got to know at present, and I should be surprised if whoever has to give what they call the "Oration" at the next Centenary of Birkbeck College, does not regard the knowledge that we possess of physics in much the same proportion as we regard the knowledge that was attainable in 1824. It is possible and probable that science then will have given to men means for good or evil much greater than they at present possess. One can only hope that they will choose the good.

PROGRESS IN BIOLOGY

By W. BATESON, M.A., F.R.S., Director of the John
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I AM invited to address you on Progress in Biology during the last hundred years. The task has one element of simplicity : since, with scarcely a tinge of exaggeration, my terms of reference may be held to include the whole subject from its inception. The privilege is considerable : it shall not be abused. I wish, however, to insist on the fact that, though the materials studied by biologists are those which have been the objects of man's curiosity from the earliest times, yet the biological way of looking at them was new, and that biology was a term deliberately selected to proclaim the consciousness of a new hope. Treviranus—Gottfried Reinhold, 1776–1837, of Bremen, elder brother of the well-known botanist Ludolf Christian (1779–1864)—was the first to use the word *biology* (1802). He complains that the current treatments, both of zoology and botany, were lacking in penetration and in comprehensiveness, and that their practitioners were too often giving a divided attention, with an eye ever wandering towards medicine and other applications.

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The catalogues of plants and animals, and barren descriptions compiled in the name of those sciences, are a beginning, not an end. They are the materials which the science of living things is to absorb and co-ordinate. The problem before the biologist is : What is Life? and the collections have value in so far as they contribute to a solution of that problem. Treviranus says all this, and says it very well, with a lofty but well-controlled imagination. If some one objects that he is offering old things in a new form, he will not deny that, but he claims that to see them in the new form is no trifling help. Surely he has proved right. The new word connoted a new thought. Though it was not given to him to see further into the mystery than his contemporaries, nor, indeed, so far as many, notably Bichat and Lamarck, he was looking in the right direction, and he polarised the attention of many more.

Sir William Lawrence introduced the word into English in those lively *Lectures on Physiology* (ed. 1818),¹ which, in spite—or perhaps in consequence—of much detraction, went through many editions and were very widely read. He, too, was aware that the term “biology” implied a certain ambition.

We see other signs that about a century ago the study of life underwent a renaissance. Before

¹ See especially pp. 52 and 58-60, ed. 1823.

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biology was dreamed of there were plenty of good naturalists, men devoted and exact, full of curiosity, gathering truth where they could, in the right spirit of science, but it is at this critical period that we first hear those graver notes of more resolute endeavour which thenceforth constantly recur. The gain in depth and precision was, of course, promoted by the development of microscopy, but the aspirations of the first biologists to obtain a fuller understanding of the nature of life had been excited, and their minds were prepared before that visible revelation came in unquestionable form. I like, at least, to think that the questions were asked before the instrument makers came on the field. Sage Sidrophel who—

“made an Instrument to show
If the Moon shine at Full or no,”

has been a great begetter of modern researches, but less fortuitous discoveries are the more honourable and command a warmer admiration.

However that may have been, as a matter of history the first great advance was the recognition of the cell; and nowadays, when we say biology, we mean the study of life in terms of cells—their structure, properties, and behaviour. The microscope led soon, though not immediately, to the cell

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theory, and cellular biology began. It is not my purpose to repeat that familiar story. I would ask you, however, to observe that, little as we yet know of life, it is not a century since we began to be certain about even the proximate and easily accessible phenomena which characterise life. The rudiments of chemistry, to be sure, were still only dimly apprehended, and you may think that, in the absence of chemical knowledge, sound ideas about life could scarcely be expected. Perhaps ; but surely the essential feature which—apart from psychical attributes—differentiates living creatures from all other systems whatever, might have been distinguished by ordinary observation, at any time. Living organisms are systems which have the power of continual and spontaneous division. In that they are unique. *How* they divide could not even be imagined, much less investigated, without the microscope ; but nothing in the history of discovery is more curious than this fact, that till well into the nineteenth century men should not have known familiarly that living things come into existence solely by a process of orderly division. The conception of the cell as a unit was necessary to give anything like accuracy to this knowledge, but it was not essential, and may not improbably be replaced hereafter.

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Scarcely less remarkable is the fact that upon this process of division attention has only quite recently been concentrated. The other attributes of life, chemical and physical, have proved both more amenable to experimental study, and more prolific in fine discoveries immediately applicable to medical practice ; with the result that to them—at least in our English use—the once comprehensive term Physiology has become exclusively attached. An overburdened study must discard something, but it is scarcely fortunate that the process of genetical division, the central phenomenon of physiology, should in its several manifestations—heredity, variation, segregation, differentiation, and the regulation of form—be unfamiliar ground to academic physiologists.

I have spoken of the moment from which our survey begins as a time of renaissance. The student of to-day sometimes scarcely realises what happened then. A hundred years ago you might find an undescribed—even an unnamed—animal any day on the British coasts. Next to nothing was known of the development of any creature whatsoever, animal or plant. The student's microscope, of course, did not exist, and, indeed, was only coming into general use in my own student days. Neither my revered master, the Professor of Zoology of that

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time in Cambridge—a man of great learning and distinguished gifts—nor his colleague, the Professor of Botany, could use a microscope to any purpose ; and I doubt if either of them would have seen much in a section of anything. No doubt we were a bit behind the rest of the world just then. They were ahead of us in France, and very greatly ahead in Germany. Reputation, if not fortune, might occasionally be made by a little judicious dumping of foreign products. That state of things happily soon passed away, and an international standard of scientific public opinion in biology became universal.

Though in 1824 little was known of what we now call morphology, the unicellular organisms had not attracted serious attention at all. Such creatures, even some bacteria, had been seen, but no one had felt much concern about them. If you care to attach history to dates, let me give you two easy ones, worth remembering. The year 1838 is the year in which Schleiden gave formal expression to the Cell Theory, and being also the date of Ehrenberg's *Infusionsthierchen* with the first good pictures of bacteria and many infusoria, is doubly memorable. Ten years later we come to 1848, a date which in significance to mankind may rank with 753 B.C.—I had almost said 4004 B.C.—indeed, almost any of the greatest anniversaries.

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In written history there are only a few cardinal points : the invention of printing, the First Folio Shakespeare, Newton's *Principia*, the discovery of oxygen, with some dozen more. Of these, most certainly one came in 1848, when Pasteur first demonstrated to Biot his observations on the asymmetry of tartrates. From that one small bit of clean experimenting, interpreted by penetrative genius of the highest order, has grown modern surgery, a rational investigation of disease, bacteriology, much of bio-chemistry, hygiene—with all the consequences that those developments have had on vital statistics, the structure of populations, and contributions to almost all the arts and the multifarious activities of civilised man. The year 1848 was the year of the revolutions. The public was not thinking much about bacteria or biology. Mobs were in the streets, and the fermentations then most regarded were metaphorical. But the world as we see it to-day is rather the product of biological discovery than of democratic institutions, and there are moments when your modern Esau would wisely barter a lot of his political rights for some honest antiseptic.

The great corpus of knowledge grows by solid increments, definite, predicable, discoveries of fact. Rarely is any piece of interpretation an event of

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equal consequence. In that small group of fertile theories by common consent we class the *Origin of Species*. For the public of 1859 Charles Darwin's book seemed, and for most of the laity to-day it still seems, like some meteor of the heavens, to have been a revelation unheralded. That, of course, we know it was not. Apart from earlier adumbrations, some vague, some clear, the doctrine of evolution took categorical form in the hands of Lamarck (1809). For fifty years the new ideas were strenuously debated, especially in France. The discussion, nevertheless, had reached England, though our contributions were largely on the *non placet* side. Chambers (1844) was a timid evolutionist; Herbert Spencer, though no naturalist, a bold one (from 1852). Lyell, in 1832, had argued against "evolution," adopting the word. Sir W. Lawrence had (1818) collected many illustrations of variability, but maintains that none transgress the limits of specific difference, and he took a firm stand against the Lamarckian teaching of the transmission of acquired characters, which he declared was contrary to experience—the first, I believe, actively to denounce that fallacy. The very considerable work of Godron, *De l'Espèce*, appeared in book form in 1859, the year of the *Origin*. Godron was a most competent botanist.

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His collection of evidence as to variation was the fullest yet compiled. Most of it was afterwards incorporated in *Animals and Plants*, but the book is still of value. Godron examines *la théorie de l'Évolution successive de l'espèce*, and rejects it. Darwin, using very similar evidence—though greater in quantity and more varied in character, with the introduction of the one wholly new consideration, Natural Selection—succeeded in making the doctrine of transformation acceptable. Natural Selection was an undeniable *vera causa*, whereas few had felt quite comfortable about Lamarck's appeal to the effects of conditions. The presentation, moreover, was set forth in language so suave and cogent that the reader gladly resigns himself into the hands of a master. With the advances in knowledge, the additions from embryology, from palæontology, geographical distribution, and many other convergent lines, the truth of the doctrine of evolution became in broad outline finally established.

This much being admitted by all, we may inquire, why had so many good naturalists, whose information was sound, resisted so firmly. With the exception of natural selection, every essential element in Darwin's case had been present to their minds before. To suppose that all these writers had suffered from theological obsessions is absurd.

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Lawrence, for instance, flouted authority with great enjoyment. They were genuinely convinced, some of them probably against their will, that the mutability of species was contrary to observation. Remember that up to Linnæus few, if any, troubled to consider whether species were or were not mutable, but after species had been declared to be immutable, those who proposed to maintain the doctrine of mutability might be expected to prove their case. What weighed, then, with Godron and careful men of his type, was that the variability they observed did not result in the production of new species, and that in particular, as they insisted, the new forms derived from a single common origin, when interbred, do not produce offspring of impaired fertility as so many genuine species do. This critical link in the evidence is equally absent from Darwin's case. He satisfies the mind about so many other difficulties that this one is allowed to pass, and the reader, learning that many putative species give hybrids fully fertile, and that between these and the totally sterile hybrids all gradations can be seen, feels that this objection must have been removed, though as a matter of fact it remains.

The progress of the last twenty years has brought us to a position from which we can at last begin to discuss these problems fruitfully. No general

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principles governing the incidence of interspecific sterility have been ascertained. We there find ourselves in a tangle of empirical and as yet unrelated phenomena, specific like those of chemistry. Expectation founded on our estimates of divergence are constantly at fault. The Oxen, the Canidæ, the Finches, the Ducks, the Pheasants: who can say right off which crosses in these orders give hybrids fertile in both sexes, or in one sex only, or in neither? which species cannot be crossed at all? Like chess openings, these things no doubt are governed by principle, but the principle is not obvious. For the right answers we depend largely on memory. They have been ascertained by accumulated experience and are not easily found "over the board."

We are clear that the forms of life are the products of evolution, but we are equally sure that specific distinctions are not culminating terms reached by the accumulation of small differences. The variations by which they have arisen are not yet known to us, but we do know that the particular account of their origin which is the one Darwin chiefly favoured is incorrect.

Of the origin of specific distinctions we have, as I have said, no acceptable account. Appeals to adaptative value are here beset by the gravest improbability. The Darwinian principle that the

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fixity of a character is a measure of its value to the possessor is not tenable. The sharpest and most permanent specific differences are constantly to be found as characteristics which no one by the utmost exercise of ingenuity has been able to represent as other than trivial in adaptative significance. Whatever stress we are disposed to lay on natural selection, it does not assist us here.

In passing, let us note that modern discoveries have given little aid with the problem of the origin of Adaptation. Darwin, in 1844, regarded all adaptation as the consequence of natural selection. His letters of that date speak of Lamarck with contempt. With the lapse of time, nevertheless, we find him frequently and increasingly appealing to the transmitted effects of the conditions of life, and between the two he sometimes does not distinguish as clearly as we would wish. His most urgent task was to make evolution an acceptable principle, and one argument failing he would invoke the other, till, in the edition of 1876, certain passages read uncommonly like Lamarck obscured. Seizing upon one which is, to say the least of it, ambiguous, the irreverent Samuel Butler makes the flippant comment: "This comes of tinkering. We do not know whether we are on our heads or our heels. We catch ourselves repeating

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‘important,’ ‘unimportant,’ ‘unimportant,’ ‘important,’ like the King when addressing the jury in *Alice in Wonderland*.”

All this matters little now. In response to Weismann’s challenge that critical proof of the transmission of adaptative responses to environmental influences should be produced, none satisfactory has been forthcoming. In one respect only, I think, we have to recognise positive evidence which Weismann did not perhaps sufficiently anticipate. The germ cells have in certain experiments been injured by special and violent treatment to which the parents have been exposed, with permanent consequences to the posterity. But there is no question here of adaptation, and such evidence does not make the origin of the adaptative mechanism more easy to understand.¹

We have reached contemporary developments. The study of variation, and, indeed, of several branches of what we now call genetics, especially cross-breeding, had been pursued with vigour in the sixties and seventies, but had totally lapsed. Renewal of those inquiries led at once to an advance. We saw that the received ideas as to the magnitude of variations, and especially as to the interrelations of the domesticated breeds, were largely erroneous.

¹ *Luck or Cunning*, 1887, pp. 185–6.

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As in regard to the incidence of sterility in inter-specific crosses, so in regard to variation, we found ourselves among an intricate mass of empirical observations, obeying none of the principles which the orthodoxy of the time presupposed. The incidence of variation was utterly capricious, and was determined neither by utility, nor the antiquity of the feature, nor by the conditions of life, nor by any other ascertainable circumstance.

Most of the genetical work of the early time had been perfunctory and unsystematic. Godron, Naudin, Verlot, Carrière, Morren, and many more, had all seen interesting things, but they had not looked close enough. A single man, Mendel, had worked in a different fashion. Again by one small bit of clean experimenting, a fact of a new class had been discovered. The evidence of this new witness showed us whole ranges of phenomena in their right perspective and proportions. We had at once a rationale which disposes of such outstanding mysteries as reversion and the determination of sex. Only those who remember the utter darkness before the Mendelian dawn can appreciate what has happened. Stories which then seemed mere fantasies, are now common sense. When I was collecting instances of variation in 1890, I remember well reading the fanciers' tales about dun tumbler

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pigeons being almost always hens, and about the "curious effects of crossing" with cinnamon canaries, but I would never have dared to repeat them, any more than Darwin ventured to quote Girou de Buzareingues (1828) to the effect that in cattle the milking-character was mainly transmitted by the bull—a proposition with which Pearl's researches have now made us familiar.

But though Mendelian analysis has done all this, and very much more, of which I will presently speak, it has not given us the origin of species. It has finally closed off a wrong road. I notice that certain writers who conceive themselves to be doing a service to Darwinism, take thereupon occasion to say that they expected as much, and that from the first they had disliked the whole thing. I would remind them that the class of evidence to which we were appealing was precisely that to which Darwin and every other previous evolutionist had appealed. Mendelian analysis led to the discovery of the transferable characters, not merely in sporadic instances, but as a group, and the study of their behaviour enabled us to avoid endless misinterpretations into which our predecessors had consistently fallen. If we now have to recognise that the transferable characters do not culminate in specific distinctions, the acknowledgment will

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not come from us alone. The old belief of systematists that real species differ from each other in some way not attainable by summation of varietal characters is no longer contestable, and we know now upon what to concentrate. It is no occasion for dismay. We have not to go back very far. We do not understand specific differences, nor can we account for the adaptative mechanisms. Was it to be expected that we should? Biology is scarcely a century old, and its intensive study is of yesterday. There is plenty of time ahead.

The identification of the transferable characters and their linkages has led to a further discovery of the greatest—I might almost say, of romantic—brilliancy, which must have consequences as yet inestimable. Morgan and his colleagues have, as you all know, proved that some, probably all, of this group of characters are determined by elements transmitted in or attached to the chromosomes. It may be, as Bridges has indicated in regard to sex, that the visible distinctions are produced not so much by the presence or absence of a bit of special chromosome material, as of an interaction between the several chromosomes as a whole, and much depends on that issue; but, however that may be, henceforth the study of evolution is in the hands of the cytologists acting in conjunction with the

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experimental breeder. As to what the rest of the cell is doing, apart from the chromosomes, we know little. We think that in plants the presence or absence of chloroplasts may be a matter of extranuclear transmission. Perhaps the true specific characters belong to the cytoplasm; but these are only idle speculations.

While all this has been going on we learn of advances developing from a totally different quarter—palæontology. Those whose work has lain in other fields can form only a dim and tentative understanding of these new lines of discovery. We look eagerly to the palæontologists for a full exposition. We have heard that they, especially the group of investigators connected with the American Museum, have collected wonderful series, in numbers hitherto never attainable, ranging through many geological epochs, demonstrating a continuity of succession between very dissimilar forms of life. For an introduction to this subject I am greatly indebted to Professor D. M. S. Watson. In connection with these observations we hear frequent use of the term “Orthogenesis,” a word introduced by Eimer to express the notion that evolution proceeds along definitely directed lines.¹ Eimer

¹ *Artbildung u. Verwandtschaft bei den Schmetterlingen*, ii. (1895), P. 3.

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was both a vigorous opponent of Natural Selection and a confirmed Lamarckian. His idea had been enunciated at various times by others, but in spite of a superficial attractiveness such short cuts have seemed too facile, and to be avoided in the absence of irresistible evidence that they are right. Nevertheless, what we have learned of variation, especially of the incidence of parallel variations, has taught us that many varietal forms owe their origin to a process of unpacking a definite pre-existing complex, with the consequence that, given the series of varieties to which one species is liable, successful predictions may sometimes be made as to the terms which will be found in allied series. This is not what is meant by Orthogenesis, but the phenomena have features in common. These symptoms of order in variation have prepared our minds, and there may well be a sense in which Orthogenesis will be found to denote a valid principle. Granting that a gradual and secular evolution in one direction is demonstrated, much turns on the evidence that can be produced as to the other variations by which these changes have been accompanied. We anxiously await such details. Especially are we curious as to the nature of the characters concerned. Are they such as in our contemporary experiments we have found to be transferable, and thus likely to be

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subject to clean segregation? Secondly—a question much more difficult to answer—is it possible that, though undoubted as indications of the course of an actual evolution, the most positive indeed which can be imagined, they should be interpreted as evidence of the origin of species in that stricter sense to which genetics has introduced us?

A sound analytical classification of the several kinds of characters in respect of their modes of variation is greatly to be desired. We have determined the transferable characters as one group, and we no longer confound them with the essential elements conferring specificity. Segregation is, of course, often seen in species crosses, but as to the behaviour of these critical elements we know as yet very little.

Of a third group we may presently learn from the palæontologists. Independent of all these substantive characters we shall distinguish what I have called the Meristic group, as a fairly homogeneous class of phenomena recognisable without much difficulty though still not precisely defined.

That is a place to which I always looked for one of the great discoveries about the nature of life. The phenomena of Meristic repetitions, especially in their most obvious manifestations as seen in simple patterns, would appear to be amenable to

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analysis. Who can look at the stripes on a zebra's hide—to take one of a thousand such—and not see them as a series of waves ? and further, who can compare the hide of *Equus Zebra* with that of *Equus Grevyii* and not see that in *Grevyii* the wave-length of the same vibrations is halved ? It is in the analysis of pattern that mathematical treatment might properly be applied to biology. If some physicist would examine our patterns and, treating the problem as one of ordinary mechanics, set himself to consider how the forces must be disposed to produce those patterns, I am not without hope that he might find a clue to the nature of the forces themselves.

The future of biology lies not in generalisation, but in closer and closer analysis. It is the lack of analytical penetration that we so miss in the nineteenth-century evolutionists. Phenomena the most diverse are confounded together and discussed under some common name, for example, Variation. The aim is always to unify, never to distinguish.

Never are we reminded that every appeal must ultimately be to the mechanics of cell-division. That is the one true and logical unification. The cell, as Cuvier said of the living organism long ago, is a vortex of chemical and molecular change.

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Matter is continually passing through this system. We press for an answer to the question, how does our vortex spontaneously divide? The study of these vortices is Biology, and the place at which we must look for our answer is cell-division.

PROGRESS IN HISTORICAL STUDIES

By DR. G. P. GOOCH

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I UNDERSTAND that the chronological limit of these addresses is the last hundred years ; but before I deal with that period, I must briefly recall the achievements of historical study during the generations which preceded the opening of the nineteenth century. We may divide the work that was done in this field into four classes.

First, the collectors, the men who collected material, brought it out of the archives and put it into print, such as Baronius, who revealed many of the treasures of the Vatican ; the great group of French Benedictines of the seventeenth century who ransacked the monastic libraries of their own country and of half Europe ; and, perhaps greatest of all, Muratori, of whom I can only say that it is difficult to understand how one man in the course of a single life was able to read, to write, and to print as much as he did.

The second class consists of the narrators—narrators of the past as opposed to men like Clarendon and Burnet, who were writers of memoirs

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rather than writers of history. The great narrators come in with the eighteenth century, when you get distinguished names like Hume and Robertson, Gibbon and Voltaire. Those men made history a branch of literature. They were rather men of letters than great scholars; but they induced people to read history and to take an interest in the past in a way that had been impossible for the mere collectors.

The third class I call the critics, the pioneers of historical criticism, though they followed the light of nature rather than applied a method. You get brilliant inspirations; you get fruitful scepticism. Perhaps the two foremost figures among the critics who lived before the nineteenth century were Mabillon, the greatest of the French Benedictines, whose treatise on Diplomatics was the foundation of the critical study of mediæval documents, and, a century later, the German scholar Wolf, whose *Prolegomena to Homer* was the first outstanding achievement in the critical study of the ancient world.

My fourth class contains the philosophers—men who were thinkers more than historians, but who brought to bear upon the processes and records of history the philosophic mind. Here, again, the eighteenth century registered an enormous advance

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in the interpretation of the life of humanity. In France we have Turgot and Condorcet—Turgot taking a marvellously comprehensive and objective view of human development, and Condorcet reflecting the buoyant humanitarianism of the eighteenth century. In Germany we meet their great contemporaries Lessing and Herder—Lessing the author of that wonderful little tract on the Education of the Human Race, in which in a few pages you get the whole essence of the doctrine of human evolution, and Herder's long and rather unreadable book, *Ideas on the History of Mankind*, in which the idea of development is worked out in greater detail. In these four thinkers you get the introduction into the field of historical work of the conception of development, without which serious thinking about history is impossible.

So much by way of preface to the nineteenth century. Historical science as we know it was born at Berlin a hundred years ago. The University of Berlin was one of the results, and perhaps the best of the results, of the overthrow of Prussia by Napoleon. The King of Prussia, Frederick William III, made that memorable observation that it was necessary for his fellow-countrymen to recover in the spiritual field what they had lost on the material plane. For this purpose the University of Berlin

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was founded in 1810, and some of the greatest scholars then living in the other States of Germany were invited to adorn it. Niebuhr delivered the lectures which were ultimately worked up into the first real history of Rome ; August Boeckh wrote the first scientific treatise on the social life and organisation of ancient Athens ; Eichhorn published the first adequate survey of the development of German law, connecting it with the life and growth of the people ; Savigny introduced into the study of law the idea of organic evolution, which the thinkers of the eighteenth century had applied to other aspects of human activity. These were the men who founded what has been well called the Second Renaissance, not indeed so glittering and creative as the Italian Renaissance of the fifteenth century, but producing not less profound effects on the mentality and outlook of civilised mankind.

I now come to the year 1824, which is an extremely convenient starting-point, not only for our centenary, but for a survey of modern historical methods ; for in that year Ranke, the greatest of all names in the field of history, published his first book. He was not one of the original teachers at the University of Berlin, but was imported from Frankfort on the Oder. His *Survey of the Latin*

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and Teutonic Nations at the end of the fifteenth and the beginning of the sixteenth century was not particularly illuminating, and the book itself is perhaps the least valuable of his sixty volumes. But his narrative was accompanied by a critical discussion of his authorities, and it is his appendix which makes 1824 a date of cardinal importance.

Ranke's name stands above all for the invention of the critical study of sources. In his preface to this book—a preface which became and remains famous—he said: “My task is to describe what actually occurred” (*wie es eigentlich gewesen ist*). That sounds a sufficiently commonplace observation, but, as a matter of fact, he not only intended to do it, but he did it. He described events, so far as any human being can ever describe events, as they actually happened. In order to do that he had to estimate the value of his sources; and his critical discussion of the sources of his narrative, Machiavelli, Guicciardini, and other chroniclers of that time, remains to this day a model demonstration of the first task of the historian. The example which he set was followed up during the sixty remaining years of his literary life, and scattered through his masterpieces you will find a series of analytical discussions which it is a joy even at this distant date to read and re-read.

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If the first lesson that Ranke taught was that you must discover the value of your authorities, the second was that you must get to the original authorities ; that a contemporary authority is worth a great deal more either than the memoirs of actors written by themselves in after-life or than the narratives of historians who lived a considerable time after the events which they describe. He dethroned the memoir—which had imposed on the pioneers of historical narrative, as you will see in books like Carlyle's *French Revolution*—and he put in its place the original document, the reports of diplomatists, the records of meetings and councils, the correspondence of statesmen and rulers.

In the next place he introduced an objective method of dealing with the past in which nobody had ever surpassed him. He said himself with pride that no reader of his most famous book, *The History of the Popes*, could tell whether it was written by a Catholic or a Protestant. Although it is true that in his narrative of the German Reformation he makes no attempt to hide his confessional affiliations, there is an objectivity about his work as a whole which raised historiography on to a higher plane. In his *History of Prussia*, his *History of France*, his *History of England*, you get a tranquil detachment which was new in historical literature.

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And finally he realised that Europe was one, and that the history of any one State was unintelligible unless you studied its connection with other States and with the life of the Continent as a whole. In other words, he preached and practised the European outlook and the European background.

Ranke not only lectured in the University of Berlin for fifty years, and wrote sixty volumes, the majority of which retain their value to this day, but he founded a critical school to which young historians flocked from all parts of Germany, and, indeed, from other countries. His pupils, of whom the first and greatest were Waitz, Sybel, and Giesebrecht, carried his methods away with them to other universities, and in turn reared up generations of students trained in the Ranke tradition. It is impossible to exaggerate the importance of his life-work for the raising of history from a branch of literature to a branch of what can truly be called science.

After thus recalling the introduction of scientific method into historical study, let us summarise a few of its conquests. In every department you will see the enormous advance which has been made between the early nineteenth and the twentieth century, an advance as great as in chemistry and physics, biology and geology. Indeed, one of the

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main achievements of the nineteenth century was the scientific study of human evolution.

A hundred years ago the world of primitive man was unknown, the science of anthropology unborn. It is only in the last half-century that the dim world in which the story of civilisation began became intelligible. The honoured name of Tylor, the founder of anthropology, ought not to be omitted in any survey of historical work, because the distinction between pre-history and history is one which we make merely for our own convenience. The second of the great interpreters of early man is Sir James Frazer. To his monumental treatises *The Golden Bough*, *Totemism*, *Folk Lore in the Old Testament*, and the edition of *Pausanias* we owe more of our interpretation of the early life and thought of man than to the writings of any other scholar. I am well aware that we are still moving about in worlds only partially realised ; but, comparing our knowledge with that of our grandfathers, the advance is extremely satisfactory.

Nothing more wonderful has taken place in the field of scholarship during the nineteenth century than the revelation of the civilisations of the Ancient East. The story begins with Champollion, the decipherer of hieroglyphics ; and, when the key to the riddle was discovered, Lepsius mapped out the

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vast spaces of Egyptian history. The spade of Mariette, Flinders Petrie, de Morgan, and other archæologists added to the materials from which scholars like Erman and Breasted reconstruct dynastic and predynastic civilisation.

In Assyria the story begins in the middle of last century with the work of Botta and Layard at Nineveh, followed by the decipherment of cuneiform, mainly by Sir Henry Rawlinson. In the later decades Sumerian civilisation was brought to light by the excavations of de Sarzec at Telloh in Chaldæa. In our own generation clues have been followed up in the middle part of the Land of the Two Rivers, in what used to be Babylonia proper. The excavation of Babylon itself was begun by the Germans before the war, was interrupted by the conflict, and has not been resumed; but British scholars are busy at Kish, and operations at Babylon will doubtless be resumed in due course. The discovery of Hammurabi's Code by de Morgan at Susa brings us very close to Babylonia in the third millennium.

Pushing northwards from Mesopotamia we reach the Hittite civilisation in its two homes, in eastern Asia Minor and in north-west Mesopotamia. We are now able to fill up a gap in the history of the second millennium and the early centuries of the

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first millennium B.C., and can reconstruct a polity spreading from Smyrna on the one side almost within sight of Damascus on the other. Unfortunately, despite some gallant attempts, the Hittite script has not yet been deciphered. Still more baffling is the script of the Minoans, the builders of Cnossus, whose opulent and pacific civilisation has been revealed and described by Sir Arthur Evans. The exploration of ancient Palestine is only beginning; but Professor Macalister has revealed to us the lineaments of the much-maligned Philistines, who were probably a good deal less "Philistine," to use Matthew Arnold's classical expression, than most of their neighbours. In addition to reading the languages and excavating the monuments of the early East, scholars of different nationality have woven these various threads into a connected whole. The first attempt was made by Duncker in the middle of last century, a second by Maspero, and a third by the Berlin scholar, Eduard Meyer, whose *History of Antiquity* is one of the greatest achievements in the field of historical learning. When, however, the Cambridge *Ancient History* is complete, we shall hardly need to look elsewhere for a guide.

If we compare our knowledge of Greece with that of our grandfathers, we shall find that the

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progress is almost as great as in our mastery of the civilisations of the early East. The collection of inscriptions, the discovery of new sources in Egypt, of which Aristotle's treatise on the *Constitution of Athens* is the most important, the revelation of Mycenæan civilisation by Schliemann and his successors have given us a new Greece and placed "Homer" in his proper perspective, standing not at the beginning of Greek history, but between two periods of civilisation.

There is now not a single aspect of Greek life and thought, literature, science, and art which has not been carefully studied; but the theme seems inexhaustible. Many of you, I hope, have read Mr. Zimmern's book on Athens in the fifth century, *The Greek Commonwealth*, one of the novelties of which is to paint the economic background of the life of the little republic. You will get a good idea of the pace of our advance if you compare Professor Bury's *History of Greece* with that of Grote. We have also become more impartial. Unlike Grote, we can be fair to the Macedonians, to Philip and Alexander, thanks above all to Droysen, who compiled the first detailed account of the Hellenistic Age. In our own day Beloch has traced with a master hand the diffusion of Hellenic influence and culture over Western Asia and Northern Africa.

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Roman history before Mommsen was like Rome before Augustus. You remember what Suetonius said of Augustus : " He found it of brick, and left it of marble." Everybody knows that Mommsen wrote the first and greatest history of republican Rome ; but from the point of view of scholarship that is one of the least valuable of his works. The *Corpus of Latin Inscriptions* which he began, and which has now swollen into a library, rendered it possible to reconstruct not only the history but the mechanism of the Roman Empire in three Continents, and enabled him to write his volumes on the Provinces. The greatest of his works, the *Staatsrecht*, reconstructed Roman institutions, and explained the evolution of the Princeps into the Emperor. His *History of Criminal Law* in like manner was the first detailed account of a branch of law in which, as in other branches, the Romans were the pioneers. His minor writings—on coinage, chronology, dialects, and many other themes—fill a shelf of stately volumes. Finally, like Ranke before him, he founded a school. Every worker in the field of Roman history is conscious every day of his life of the debt that he owes to the consummate scholar whose place is with Ranke—and with Ranke alone—in the first class of scientific historians.

In no department has there been such a welcome

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change as in what used to be called Sacred History, that is to say, the history of the Jews and of the Christian Church. A hundred years ago a man so orthodox as Dean Milman was thought rather wicked for having introduced into his *History of the Jews* a certain element of critical appreciation, and Ewald was the target of similar suspicions in Germany. It was considered that the story of the Jews had been written once for all in the Old Testament, and the story of the foundation of the Christian Church once for all in the New Testament. Both fields have witnessed the invasion of the critical spirit, which knows nothing of paper walls between the sacred and the profane. You have all heard of Baur, the founder of the Tübingen School, who introduced the idea of development into the study of dogma and institutions. Although the detailed constructions of his school are now generally rejected, we owe a great deal to the men who pulled down the notice board "No thoroughfare," which prevented the interpretation of these most interesting chapters of human history, the development of the Jewish polity on the one hand and the establishment of the Christian Church on the other.

The greatest interpreter of the history of the Jews is Wellhausen, who, although not actually the first to discover the key to the chronology of their

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institutions and religion, applied that key to the door and unlocked the treasures within. The real order of the books of the Old Testament turned out to be very different from that in which we find them in the Bible. The law, which comes very early in the Old Testament, ought to come at the end, and parts of the Prophetical books at the beginning. The historical books, though containing some very early documents, like the Song of Deborah, were written long after the events they describe. There were two Isaiahs, if not more, and nearly all the Psalms are post-Exilic. Scarcely inferior in importance is the advance in our knowledge of the debt of the Jews to Babylonian civilisation, whence they derived so much of their culture and so many of their legends and ideas. We are at last able to regard the Chosen People in historical perspective.

An even more controversial subject has been brought within the realm of scientific history in the early Christian Church. The work of the Tübingen School prepared the way for giants like Weizsäcker and Harnack, who have covered the whole story, from the foundation of the Christian communities till Christianity became the State religion of the Roman Empire, in a series of works of marvellous scholarship, great literary power, and admirable impartiality. People will continue to hold their

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own beliefs as to whether the foundation of the Christian Church was a natural or supernatural occurrence. The old notion that the critical study of sacred history was inimical to faith was baseless. What history had the right and duty to do, and what it has done, was to discover the value of our sources, to establish the sequence of events, to reconstruct the life, institutions, and ideas of men. We are now able to locate Christianity in the world of thought at the time that it appeared. If you take such an admirable summary as Pfleiderer's *Primitive Christianity*, you will find an extraordinary heightening of interest, and will be able to measure the resemblance to and differences from the cults and philosophies of Persia, Greece, Asia Minor, Egypt, and Rome. The labours of de Rossi in the Roman Catacombs have aided us to visualise the world of the early Christians.

Of primary importance has been the rescue of Byzantine history from the men—of whom Gibbon was one of the chief offenders—who failed to realise its interest and services. There is nothing more remarkable in Gibbon's masterpiece than the way in which after Justinian he loses interest in his story of the Eastern Empire. The feeblest part of his immortal work is that devoted to the later centuries of the Byzantine rulers. We now know

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—and we owe our knowledge more to Finlay than anybody else—that even in its later period the Empire stood for a great deal in the preservation, if not the development, of European culture. Just as in the old days it kept back the Arabs, so in later days it kept back the Turks ; and, although it ultimately succumbed to their onslaught in the fifteenth century while Christendom looked on, absorbed in its squalid quarrels, it held the fort until emissaries carrying Greek learning with them migrated to Italy and sowed the seeds of what became the Italian Renaissance and ultimately of the culture of the modern world. The full story may now be read in the fourth volume of the *Cambridge Medieval History*.

Of the Middle Ages I can only say that here again scientific methods have been victoriously pressing forward towards their goal. Milman's *History of Latin Christianity*, though not a great book, was a most useful performance. It enabled Protestant readers to see what an enormous part was played in mediæval life for a thousand years by the Church, and it was written with a welcome coolness of blood. The study of mediæval institutions, both ecclesiastical and secular, has made a magnificent advance. If you compare Hallam's famous volume on the Middle Ages, which our

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grandparents used to study, with Bryce's *Holy Roman Empire*, and the works of such men as Waitz, Stubbs, Maitland, Gierke, Vinogradoff, and Luchaire, you will see that we now understand the structure and ideas of mediæval Europe in a way that was impossible a hundred years ago. But the more difficult question of the character and influence of the Church still gives rise to sharp antagonism between representatives of different churches and different schools of thought. The picture which you get in the works of Cardinal Gasquet on the one hand, and of Mr. Coulton on the other, is so different that it shows that a great deal of work has still to be done before we can reach an agreed presentation. Our own country, for instance, cannot boast of a survey so full and so fair as Hauck's monumental narrative of the Church in Germany. Mediæval thought is becoming more intelligible to us not only in its philosophical, but also in its political and economic, aspects, and social life has been studied with zeal and success. Such a work as Rashdall's *Mediæval Universities* prevents you from ever again regarding the later centuries as an age of darkness ; but the massive volumes of the American scholar, Henry Charles Lea, on the Inquisition, Sacerdotal Celibacy, Confession, Indulgences, and Ordeal by Battle suggest the shadows in the picture.

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The Reformation is an illustration of the way in which competing conceptions of a controversial epoch gradually tend to approach. No Englishman has done more to cool the temperature, which is the essential preliminary to the capture of truth, than our own Bishop Creighton, whose *History of the Papacy* displays a rare impartiality, which does not desert him whether he is dealing with the Borgias in Rome or with Luther in Wittenberg.

It is a pity that his brilliant gifts mounted him upon an episcopal throne, the penalty of which was that he had to end his story with the Sack of Rome in 1527.

If you take the best sort of Lutheran such as Kawerau, the greatest of Protestant specialists on the Reformation, you will find an immense advance on the hagiology which you get in almost every book up to about 1880. We owe also valuable additions to our knowledge of the Reformation to the learned and powerful books written by Catholic scholars from Döllinger to Denifle and Grisar. The most popular of such works is Janssen's colossal treatise, *The History of the German People*, which has been treated as a sort of Bible by Catholic controversialists for the last half-century. A more scholarly work, based for the first time on full access to the Vatican archives, which were opened by

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Leo XIII in 1881, is Pastor's immense *History of the Popes*, which carries us from the middle of the fifteenth century to the time when the Counter-Reformation is in its full stride.

I have left myself little time to refer to the scholarship dealing with modern Europe. I divide that work roughly into two periods, the first of which I call the age of the amateurs—the age of Macaulay, Carlyle and Froude, of Bancroft, Prescott, Motley and Parkman, of Michelet and Thiers, men who commanded a brilliant style, who did a great deal of hard work, but who had never mastered the critical method, and the interest of whose books largely depends on the vivid reflection of their author's personality and opinions. I am the last person to undervalue the achievements of the amateurs. They did what the professionals and the experts could never have done: they made a knowledge of many parts of history a necessary part of the equipment of every educated man and woman. They were, however, amateurs, not experts, and the two cardinal faults of the amateur historiography, which reached its height in the two middle quarters of last century, were its uncritical use of authorities and its rampant subjectivity.

The age of the experts begins in Germany with Ranke and his pupils, in France with Guizot,

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Mignet, and the École des Chartes, in England with Stubbs and Gardiner ; and the main outlines of the development of the modern world are clearly established. If we continue to read Froude, we check him by Pollard ; if we return to Carlyle's *Cromwell*, we supplement it with Gardiner and Firth, just as we revise his portrait of Frederick with the aid of Koser. We now read the story of the American Revolution in the balanced pages of Lecky. France supplies us with a brilliant band of scholars who combine distinction of style with sound methods of research. The philosophic Tocqueville laid the foundations for the study of the French Revolution, which has been carried on by Aulard and his school in the domestic field and by Sorel in the sphere of diplomacy. To know Louis XIV we must get behind Saint-Simon and master the judicial summary of his character and system provided by Lavissee in the great co-operative *Histoire de France* of which he was the editor. Taine's eloquent philippic against the Revolution is a throw-back to the methods of the amateurs ; but Ségur's tributes to Turgot and Necker, and Vandal's two masterpieces on Napoleon, are contributions alike to history and to literature. In Germany the stress of Prussian nationalism broke through the reserve of Ranke and inspired Droysen's

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colossal apologia for Prussian diplomacy till Frederick the Great, Sybel's elaborate treatises on the era of the French Revolution and the foundations of the German Empire, and, above all, Treitschke's *German History in the Nineteenth Century*, the nearest foreign equivalent to Macaulay's *History of England*. When the fever of triumph had abated, German historiography tended to return to the Ranke tradition; and nothing could be more impartial than Meinecke's study of the growth of the nationalist idea, or Erich Marcks's biography of the first German Emperor. Among the achievements of Italian scholarship Villari's biographies of Savonarola and Machiavelli rank highest in popularity. In the United States Channing has devoted his life to the development of the American polity, Rhodes to the Civil War, and Mahan, the most politically influential historian since Treitschke, to the achievements of sea-power.

I must mention one further achievement of our own time, and that is the ever-broadening scope of the historian's task. It is only in our own age that economic history has come into its own. Thorold Rogers, Cunningham, Schmoller, and in our own time the Webbs, the Hammonds, Mr. Tawney, and others have brought into cultivation a new and very important aspect of the life of man in

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society. The study of what some people call *Kulturgeschichte*, and what other people call the story of civilisation, is also making very satisfactory progress. Lord Acton described Burckhardt's masterpiece on the civilisation of the Renaissance as the most penetrating analysis of any period of the life of mankind. We now realise that to understand the Roman Empire we must not only study the lives of the Emperors, but must visualise the ideas and customs of the people as presented by Friedländer and Dill. Lecky's studies of mediæval morals and modern rationalism, Symonds' pictures of the Italian Renaissance, Sainte-Beuve's analysis of Jansenism, Max Weber's essays on the connection between Puritanism and Capitalism, Troeltsch's massive survey of the social teachings of the Church, Leslie Stephen's *English Thought in the Eighteenth Century*, Merz's *European Thought in the Nineteenth Century*, may be mentioned as illustrations of the fact that history now embraces every aspect of the life of man.

Those of us who are engaged in the study of history rejoice as we look back on the progress which has been made between 1824 and 1924, and draw from that retrospect fresh inspiration for the tasks that lie before us.

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By the Right Hon. STANLEY BALDWIN, M.P.

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MR. VICE-CHANCELLOR, Ladies and Gentlemen, I do not like that word "oration." You most kindly asked me to deliver one, and I accepted, but I made up my mind that I was incapable of delivering an oration, that I never had delivered an oration, and that I was not going to deliver one on this occasion, and for a very simple reason. To make an oration worth anyone's listening to is a great demand on the time of the man who makes it, and the leader of a political party has very little time indeed—unless it be in spare moments—in which to think of what he is going to say. I decided, when I learnt that my audience would consist largely of students, that I would talk to them—not give an oration—and try to tell them some things that interested me and that I hoped might be of some service to them. I would far rather do that, if I can touch any of your hearts and minds to-night, than that I would have written something which might please a limited number of people to read

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perhaps to-morrow or in after-years. I want, if I can, to get into direct touch with you for half an hour or so to-night.

It is impossible, in celebrating an event like this, a centenary, to avoid saying something at the beginning of one's remarks on the centenary itself. I make no apology for that, and that, of course, is what people will expect to see in the papers to-morrow. Our talk together belongs to you and me.

Now for the centenary. It is a hundred and twenty years since George Birkbeck, who was a Doctor of Medicine, came to London from Glasgow, in which city he had already instituted special courses of lectures for workers. This experiment, as it then was, had proved so successful that it led after some years to the creation of the Glasgow "Mechanics' Institution," the first institution of its kind in the United Kingdom, and the parent of much noble endeavour and self-sacrificing effort throughout the country. The establishment of the school in Glasgow led not unnaturally to a demand for a similar school in London, and it was natural that Dr. Birkbeck, with his record in the north country, should at once have placed himself at the head of the movement in London for acquiring similar opportunities for her workers. He was

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elected President of the London Mechanics' Institution, and he delivered the inaugural address just a century ago. At a later date the title was properly changed to that with which we are so much more familiar, and it is the centenary of Birkbeck College that we celebrate to-day.

The College was founded, as you all know, for the purpose of giving education to students in the principles of the arts they practise, and from that I infer, and I infer with pleasure, that you count no man an educated man who is not the master of his own job. From the fact that almost from the first you have admitted women on equal terms to share in your advantages, I infer that the doors of your treasure-house are open to all who knock.

You who guide the fortunes of this College are blessed indeed, because you do not have to seek your students; your students come to seek you, and that makes a very great difference. Your students are those who are prepared in the pursuit of knowledge to sacrifice what to most men is their most precious and cherished possession—their leisure. And as they are prepared to sacrifice that, they have the right to demand from you what I have no doubt you give them, and that is, the very best that you can. I need hardly say that a foundation established in that spirit is always outgrowing its

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need. What an opportunity for some one who made a lot of money in the war to hand his name down to posterity!

In your history, as is the case with all the big things in life, the better the work the harder the struggle, and your history is no exception to the rule. Obstacles to be overcome and difficulties to be surmounted faced your predecessors from the first. Accommodation to be found for the classes, the natural prejudice against the idea to be overcome, questions of finance and of economy in management—these were problems that could only be solved by patience, by pertinacity, and by wisdom. But the faith which can remove mountains was the faith of your pioneers, and some of them lived to see the College as we know it to-day—a solid, a stable, and permanent institution. It is a great and a triumphal story, and one of which you may well be proud. But at this point, I think, it will be useful for us to remember that if you want to understand history, and if you want to sympathise with your founder and the pioneers of the College, we must not make that fatal mistake of reading our history to-day, or rather a hundred years ago, in the light of the present time. I think it would be of use to us to try to throw ourselves back for a century, and then to consider a few of the ways

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in which the training we have here may help us in our after-life.

A hundred years ago popular education, so far as anybody thought of it, was regarded as a dangerous explosive. Those times are past : we do not have to do that to-day. But let us go back a century and, as I said, for a few minutes try to conjure up some vision of the past. This London in which we live was a comparatively small city compared with the one we know. A population of about one-seventh ; roads all rough with stones ; coaches going over them from the inn yards ; turn-pike gates at intervals ; and what at times would rejoice the heart of men to-day, no police. The parish constables, who were not allowed to go beyond the confines of their own parishes, and the night watchmen, kept the peace of the city. Old London Bridge was still in existence. Waterloo Bridge had only just been built. Gas had only just been introduced in the streets when your first students came here. The present Houses of Parliament did not even exist in the brain of Barry, and, as a curious instance of the remains of prejudice at that time, since the Reformation no Roman Catholic had yet taken his seat either in the House of Lords or in the House of Commons. That is a very difficult thing to realise to-day, and shows the chasm that

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separates us from the days of your first students. Stephenson's locomotive had been built only a few years before and struggled along at six miles an hour, and the "Rocket," which most of you have seen—I think it is in South Kensington Museum—had not yet been built. Steam was in its infancy, and, if I might just touch on the lighter side of life, Fauntleroy the banker had been hanged for forgery, and Mr. Thurtle for the killing of Mr. Ware.

There is another great difference in the life of that time—there was no *Daily Mail*. Nothing shows the difference which has taken place in the life of the country more than to contrast the position of the Press to-day with what it was then. At that time there was a bye-law in existence at Lincoln's Inn under which no man who contributed to the Press was eligible to be called to the Bar, and the Lord Chancellor of that time caused the greatest consternation and indignation amongst his friends by asking the editor of *The Times* to dine with him. To-day which of us would not feel proud if we were asked to dine with a newspaper proprietor!

To touch just for a moment only on one other aspect of life, which again seems difficult to realise, the Elizabethan Poor Law was still the law of the land. There were over a million people in this

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country at that time, a million and a quarter, one-eighth of the population, who were in receipt of poor law relief; and you have to look just in passing at the industrial conditions before the Factory Acts, with the cruel hours for children and those relics of what in some ways was still a barbarous civilisation, for they were rougher times than ours. Executions took place in public, and only a few years before that women were flogged in public for offences committed. Now, I think, it is good for us just to glance, as I have done, over some of those aspects that would strike you most if you could be carried back to the time of the foundation of your College. But I have rather drawn attention to the poverty, to the hardness of life, to the state of London, to point out to you and to remind you of what you know as well as I, but what I think it is good for us to dwell on for a few minutes; but hardly ever in the history of our country or of any other country was there a more wonderful and brilliant period in the literature of England than in and around the years when your College was founded. It shows that, although in many ways the country was what people to-day would call backward and unprogressive, yet there was an intellectual movement and a movement of mind that might make a country glorious for all time.

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When I have just briefly sketched to you what was going on then and what was lying in the immediate future, I think he would be a bold man who could say that to-day, with all our advantages, we can point to anything like the great men in that particular line who lived at that time. It was in the year 1824 that Walter Scott published his *St. Ronan's Well* and *Redgauntlet*, a very good output of literary work in any year and from any man. Wordsworth was still writing, and in that year died Byron, and we must remember that there passed away within two years of Byron's death three of the greatest poets in our country's history, and all long before their time—such a trinity has never been matched at one period, and so youthful—Keats, Shelley, and Byron.

Carlyle was just beginning to write, and look at those who were coming on. Darwin and Alfred Tennyson were boys, and in two years the *Poems by Two Brothers* were to make their appearance at the publisher's. In the year 1824 John Henry Newman was first ordained, one of the greatest masters of English prose that ever lived, and a man who spoke to his generation with an authority and a power possessed by few. Then, to my mind, amongst the greatest, there were just growing into boyhood Thackeray, Browning, and Dickens. Ruskin was a

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child of five, but at that time, the time when your College was founded, you will find that there was, as I said, a greater galaxy of talent of the very highest order in a literature that stands second to none in the world, and it is a great thing that you in this College take your origin from a time like that.

No country in the world can compare with our own in the literature of that period, and yet at that time there was Goethe in Germany, and Dumas had just gone to Paris from his country department, and was about to present in the succeeding year the first play which he produced in Paris. In art and in music—I am not going to weary you with names, but merely to observe that that amazing efflorescence in literature was accompanied, as sometimes it is, by an efflorescence in art and in music.

Alongside of that—and this is what I particularly want to draw your attention to—we have one more proof of what I have always firmly held, and that is that there is no race in which there is more ability latent than in our own, and there is no race with a higher aptitude for mechanical genius. It would be a very interesting subject for any of you who care to explore it, to see how many of the mechanical inventions which are light-heartedly attributed to

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Americans are really the product of British brains, whether they are British brains which have gone to work in that country, or the brains of children of British parents who have gone there. But, having regard to the foundation of your College and to the men who came to it in its early days, it is a wonderful thing to reflect that practically the industrial revolution of this country which came to us for good or for evil, was the work very largely of six or seven men who sprang from the ranks of the people, with no advantages such as you have had, and they were men who changed the face of the country and the habits and the lives of the people.

Four of them were still alive when your College was founded. Three had died not long before, but their names are worth recalling, for they were bone of our bone and flesh of our flesh, of our own English and Scottish people. They were Hargreaves, a carpenter, probably born at Blackburn; Arkwright, from Preston; and Crompton, the son of a small farmer in Lancashire. Those three men laid the whole foundation of our great cotton industry by their inventions. There was Brindley, the son of a small farmer in Derbyshire, who was apprenticed to a millwright and who was the father of the canal system of the country—a system

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which first opened up the country for industry, and which first enabled Lancashire to find a port which before long rivalled Bristol and London. There were two men, I need hardly say, from Scotland, Telford and Bell. The latter was born in Linlithgow, and he made and designed the first steamer which steamed on the Clyde, when Fulton was working out a similar problem on the Hudson. And, finally, George Stephenson, the father of the locomotive.

I have quoted these names because I wanted to make you realise, as I have done for many years, what the stuff of our people in this country is, and how that stuff is worth training and educating and bringing out of it everything that we can.

You come here to be educated. What do you mean by being educated? I do not know whether I am right—I am just an ordinary man—but it is probably true that the great number of men and women who sacrifice their time and their leisure to work and study, do so to help them to get on in life. But is that, do you think, the real, fundamental, urging, clamant reason? No. There is behind that, and there must be with people who are willing to make this effort, that desire that we all have in this room, that desire for knowledge for its own sake, for the sake of knowledge, and that we may

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force our way through those doors that open to us a kingdom of beauty and imagination, of literature, of exact knowledge, of all the things that make for the real, deep, and true happiness of life, and that make the spirit independent of the conditions in which the body lives.

I am myself a fair sample of the evening student. Many people tried to educate me, but the reaction was not always successful. A great part of my education took place after I went into business, in the evenings, on railway journeys, at odd moments, and for some years when I was working all day at business I would read nearly every evening and on all the journeys—and they were frequent—which I had to take. I think it was that education, although there may have been some foundation to build on, that did me more good than any I had received. It was through that, that I learnt the lesson, which I am quite sure will be of great value to you and which all of you who are passing out of your first youth have probably learnt already, and that is that all of us here have to, have had to, and will have to, work hard for our living. Some of us will have the good fortune to do work which we really enjoy doing, but that cannot be the case with all. Whatever your job is, there come times when you feel that all your work is going for nothing, when the

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routine of it almost chokes you, when you feel that you would sell your soul to get away from it for six months or to change it, when you feel that you are of no use to anybody on earth, when you feel that the work itself is difficult and sordid, and you feel that you are only doing it for the sake of the daily bread. It is at those times, that come to nearly every man—and I should think to a good many women—it is at those times when you may thank God for what you have learnt in the evening school or in any other school. It is at those times that, if you are able to get out of yourself, whether it be into the realm of music, or the realm of literature, or, if you be a mathematician, which I never was, into that mysterious problem, the root of minus one—whichever it may be, if you can get out in that way, you can be carried through the black times, and you will be all the fitter for your work. You will have a secret inner kingdom, into which you can retire every night of your life, if you like, and in the odd moments, and in the strength of which you can go forward with renewed vigour and renewed power and carry through any job on earth that you undertake.

Now, I asked you what education was. There have been many definitions of it. I do not propose to add to them, but you will remember that I said

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in my first few remarks that you were educated here in your early days—and I hope now—to be masters of your own job. We should all agree that that is the first thing. I said that no man is educated who is not the master of his own job, and I think I would go further and say that, to be educated, you must know enough of other men's jobs to be able to understand the part they are playing in life, to play your own part, to sympathise with other men, to play your own part at your work and your own part as a member of the Commonwealth. In other words, to have humanity, by which I mean the knowledge of the things that appertain to humanity, and urbanity, by which I mean the way of going about among your fellows as a brother man or a sister woman, ready to help, ready to sympathise, that people may be the better and the happier for associating with you, and not to go through life as a perpetual blister. The man who has humanity and urbanity is in my mind an educated man.

And do not, if this be not heresy, think too much of examinations. To work solely with a view to potting marks is not the highest form of inspiration. Let me remind those of you who are very clever men—and I address the majority—that in my view, I do not know whether every one would agree with

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me, pride of intellect is more vulgar than the pride of a *nouveau riche* in his wealth. For this very simple reason : the *nouveau riche* has made his own money, whereas your intellect is a gift of God. You may polish it up and get the best out of it, but for the instrument you are less responsible than any man.

There is one other thing I would like to say. Just as I should advise no man, if he can help it, to be a political leader, although I admit that political leaders are necessary in our present constitution, so I strongly deprecate any man, unless he is obliged, and there have to be some, being merely the specialist. I will tell you what I mean by that. I mean this. Do try, however much you may desire to excel in one special branch of knowledge, to be comprehensive to this extent, that you do not let your studies diminish your humanity. There are some studies, absorbing in themselves, too remote from mankind in their application. If you have to be absorbed in those studies, try and wed them, if you can, to literature or to music, that you may have some point of contact with your fellow-men, and that you may not be wholly wrapped up in something, however important it may be, in which the path is narrow and strait. You will be far happier yourselves, and you will

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make the people associated with you far happier too.

Of course, to my mind, there is no real, true republicanism except the republic of literature, because that is the one thing that can bind together all people who speak the same language. To me, if I find a human face light up with some quotation that ought to be known to everyone—I will give you two or three :

“ What makes him go sideways ? ”

“ Golly, what a paper ! ”

“ The light that never was on sea or land.”

“ Where I dines, I sleeps ”—

the man whose eye lights up at any of those, be he duke or dustman, that man is my brother. That is the bond, the bond of literature. Study that literature, the glorious literature of the first country in the world, your own. Whatever your studies may be, take that with you as your constant solace through life, and, as I said, you will be the happier and the better for it.

Remember this, too, you owe something, living in this part of London, to literature. You have three shades to-day haunting these streets—Dr. Johnson, Charles Lamb, and Mr. Boffin. Where these shades go—and I cannot say which of them will live longest in the memory of the British

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people—but those shades of those three great men should be guardian spirits of yours while you pursue your course of studies here.

I should like, if I may, to say a few words, and I am near the end now, to those of you who are either teachers or who are studying for the teaching profession. I do not suppose any of you have ever heard of a name I am going to mention. But I think every teacher ought to know about him. A few miles from my own home in Worcestershire—which I never see, by the way—there is a very beautiful village church dedicated to St. Cassian. Now, who has ever heard of St. Cassian? Nobody. It is the only church of that dedication in England. St. Cassian was a tutor. I thought possibly the combination of sainthood and that profession might strike some of my audience. The peculiar feature of St. Cassian was this, that he was torn to pieces by the pencils of his own students. The allegation was that he was a Christian, and he was martyred; but I have always had my suspicions that that story was written some time after the event. I belong to a bygone generation, and when I first went to school very often the feeling of us small boys towards our teachers was not unlike that of his pupils to St. Cassian. But you to-day are exceedingly fortunate in this—you are born in a time when

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there is such a stirring of the waters as has not been since the Renaissance. It is a Heaven-sent age for teachers in that you have got a people who are simply waiting to be taught.

May I ask you teachers—and you must remember I am only a spectator—to remember, in educating those who come under your charge, to avoid filling them up like little pitchers, but get the glove-stretchers into the mind. I know it is easy to say that, and I know it is a mere platitude to say, Teach them to think and use their brains, but that is the principal task of the teacher. They can only see half their work in the pupils as they have them before them: the greater part of their work is the casting of bread on the waters. The greater part of the work is shown later in the lives of those pupils and how they in their turn act, as you are acting to-day, as the lamp-bearers of their own generation. I should think in the teaching profession, more perhaps than in any other, there exists that necessity for what I spoke of for the busy man in business or in any other profession—the need of keeping the mind sweet and constantly refreshing it.

The teacher, to be an effective teacher, is always giving out—giving out of himself of the best that is in him, of his own vitality, and that is the most difficult and the most exhausting process to mind

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and body. To teachers above all others should there be those resources that I tried to speak of—literature, art, and music—in which they can refresh themselves, in which they can get away from what must at times be the drudgery of the class-room, and refresh their own spirits at the truest and deepest fount from which they will keep themselves alive and give their pupils in turn what will be of such service to them for the whole of their lives. I know in a life like mine the work is almost incessant, but I know the refreshment that can come from the smallest things if they are the things that just touch one to the quick, whether they are the things in books, whether they are the things that are open to us all in nature. Just to get down for the briefest visit into the country, to the sea, the steely blue buds of the alder by a stream, or the first anemones in a wood ; or, if you cannot leave London, the setting sun any night through a mist in any road in London that runs east and west, and there is no more beautiful sight in the world. The rising sun in the winter in London—there are few more beautiful sights when you watch it coming over the Serpentine, as I often have, and a beautiful sight for those to look at, if they have eyes in their head, who tramp across St. James's Park, having come in by the early train. There is enough

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beauty in that to last one for the day and to make one's work all the lighter. No, believe me, that the more the pressure of life is felt as you get older, the more you can find the power, and the more that power is given you to draw the refreshment that you need from the simplest things that are within the grasp of all. It is to find those simple things that should be one of the main purposes of education, to keep people's hearts and minds sane and sound and sweet.

If I might, just to finish, I should like to give one sentence, which I think we may all take to heart, but which I think is peculiarly applicable to those who are entering, or have entered, into the great profession of teaching with its immense responsibilities: "Meantime, hold hard by truth to do the duty."

That is good enough for all of us, and if so be that you can carry that out in your hearts, and your students can say of you, years after they go out into the world: "Through such souls alone, God stooping, shows sufficient of His Light for us in the dark to rise by, and I rise," then, indeed, you will have blessing yourselves on this earth, and the next generation will rise up and call you blessed.

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